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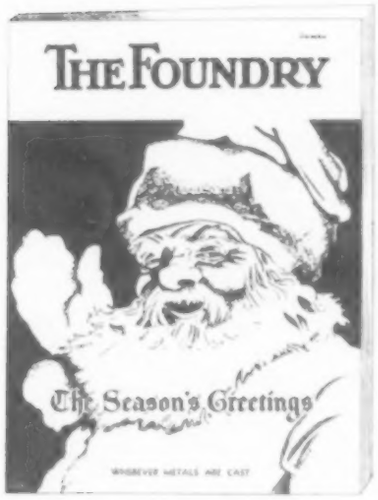

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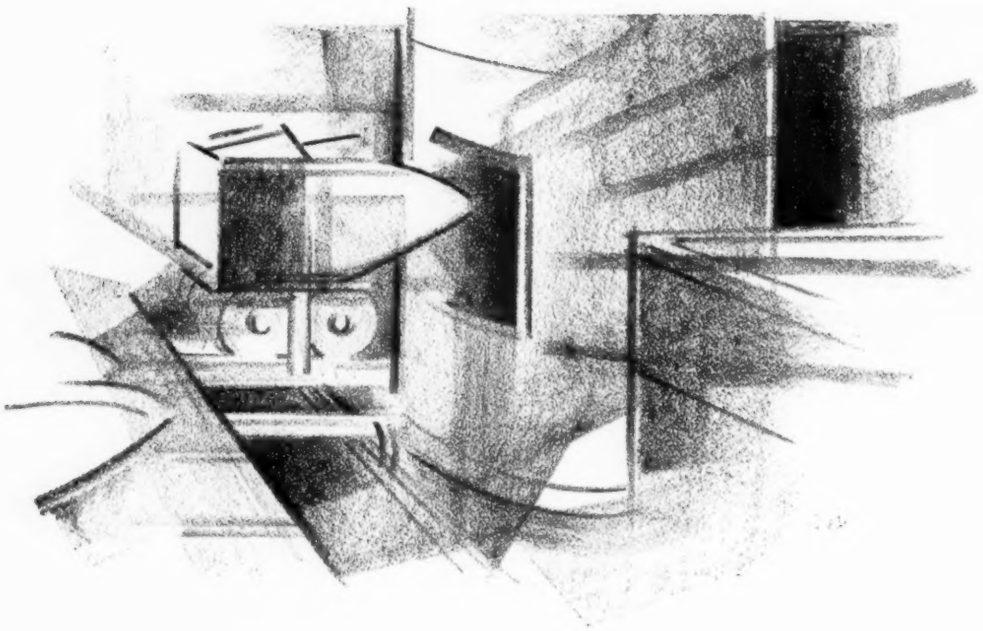

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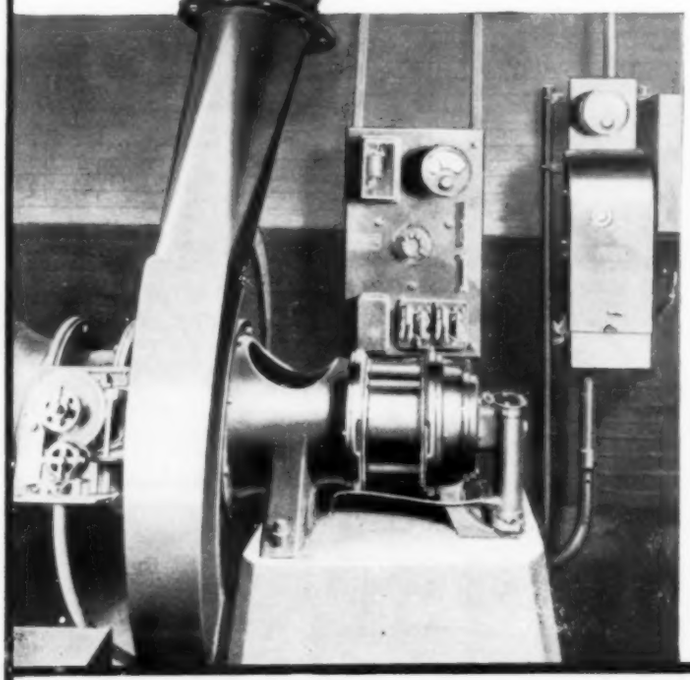

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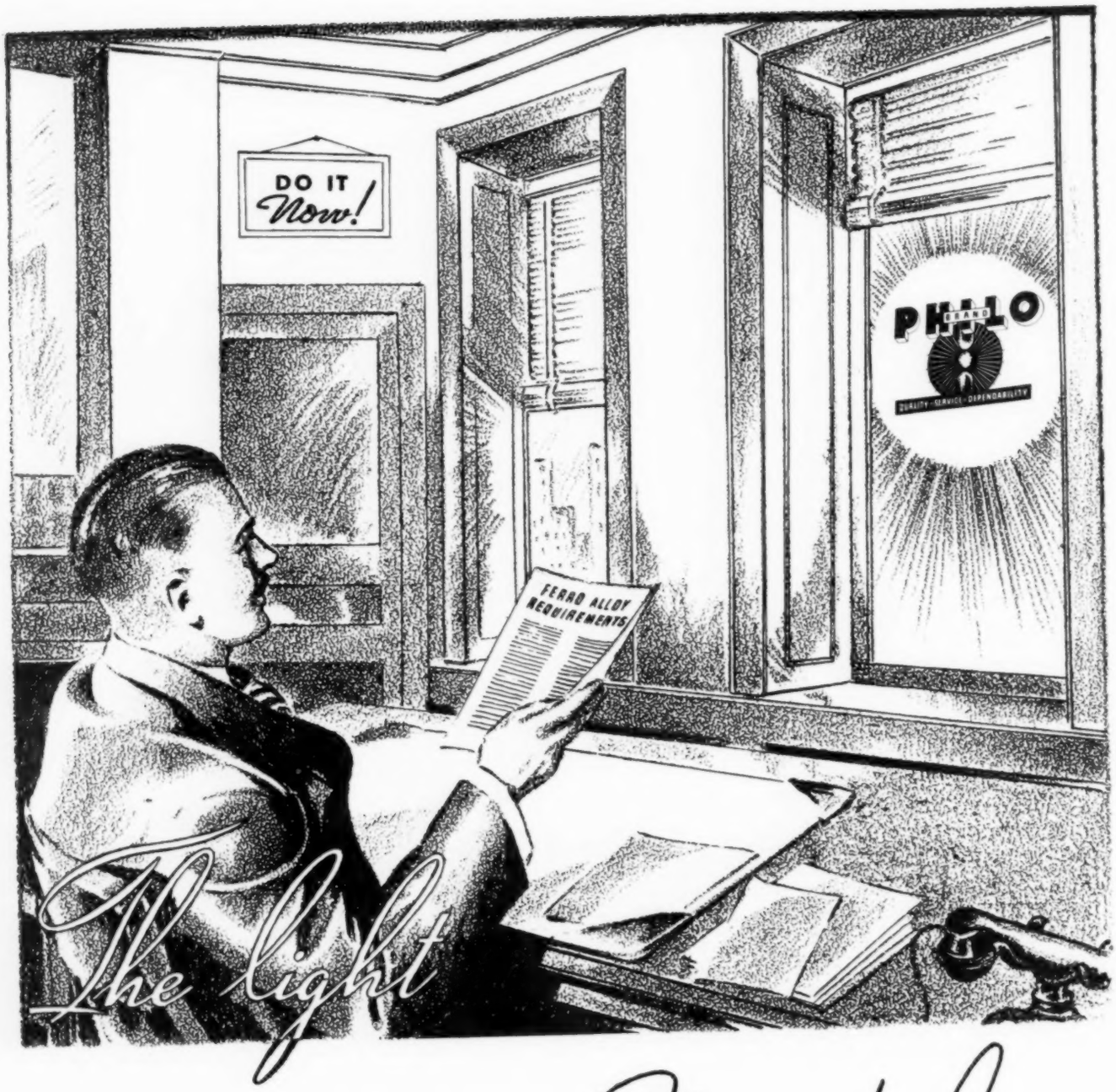

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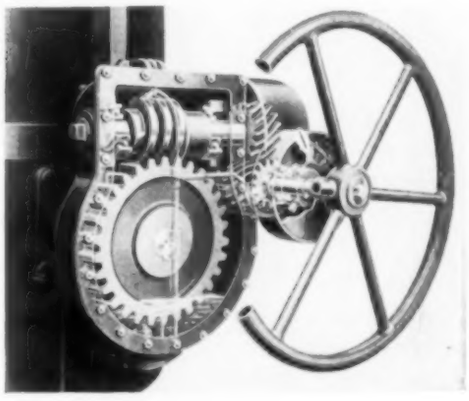

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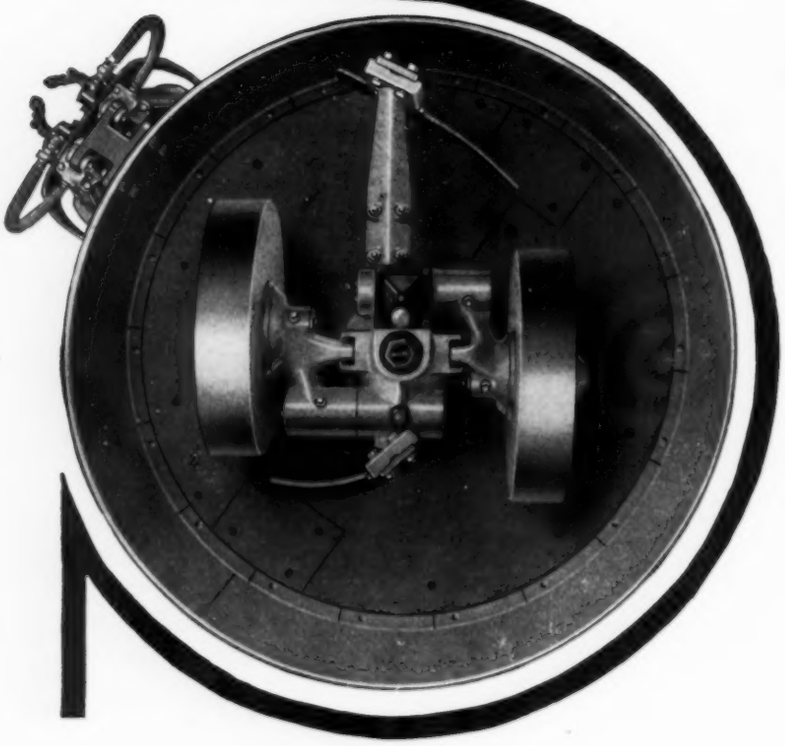

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THE FOUNDRY

for December

Status Quo IN NRA

THAT colored laborer who defined *status quo* as the "mess we am in" probably never heard of NRA, but he drew a fair picture. Groups organized under codes and endeavoring to make them work find an evident inclination to let things rock along, with the administration side stepping any action that will raise an issue. Where budgets are approved, the new contributions section will lend only moral support and issue orders in the endeavor to collect assessments from manufacturers reluctant to support code administration. Proposals have been made for basic revision of NRA compliance, which, while not promulgated, are significant. The labor compliance, in other words *cracking down* for violation of labor provisions of codes, it is suggested will be handled by regional labor enforcement divisions. These will be charged with detection, with or without filed complaints, determination of back wages involved, restitution and other measures under the labor compliance phases of existing codes.

More Latitude Is Suggested

BY contrast, the report suggests separate procedure in handling enforcement of fair competition provisions. Here more latitude is suggested. The attempt to enforce provisions upon which legality has been established will be through action brought by the district attorneys in their respective districts. On provisions where there is no common agreement as to legality, wisdom or propriety, NRA suggests action through the Federal Trade commission, with power of appeal to the courts through co-operative action of the federal district attorneys and legal counsel of the code authorities.

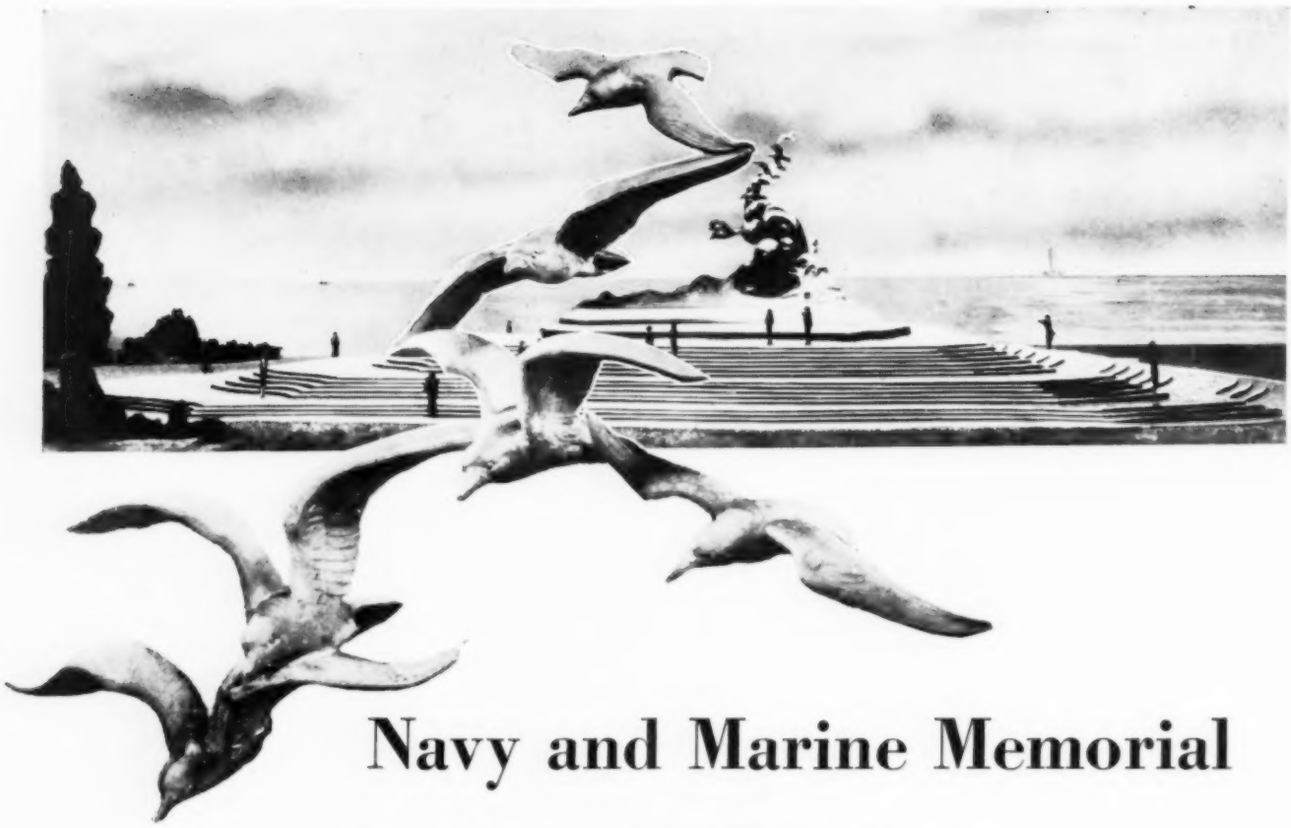
If this contemplated procedure is followed, it is reasonable to expect that the entire burden of code enforcement, on other than labor provisions, will devolve upon the industry, and probably with the entire problem of financing, administering and if necessary supporting legal action. Such procedure, although debilitating in those industries that are notoriously oppressed by bad competitive conditions, will serve to remove by trial and failure any tendency toward oppressive measures by members of an industry against competitors.

The frills and furbelows brought forward by the reform and uplift element and intended to shackle business while NRA held it prostrate, seem less in evidence. Self annointed saviors of the imaginary consumer, still are clamoring. Radio broadcasts and other forms of publicity in support of the attempt to revivify the blue eagle with an accompanying pledge of consumer support take some queer slants. In a large industrial center, one lady with a nail-file voice urged her listening housewives to buy only products showing the blue eagle so that, "manufacturers will put more money in the pay envelops instead of buying machinery."

Discussion Shows Divided Intent

DIVIDED intent is evident in the discussion of price plans, fair and reasonable cost provisions and other means intended to eliminate unfair price cutting. The published threat to remove all such, as tending toward "monopoly and restraint of trade," bumps into some distressing evidences of business failures and complaints from small establishments even where price regulation is established in relation to costs. The same is true of many of the valiantly espoused planning programs carrying various schemes of industrial birth control and plowing under plans for alleged over capacity.

Faith in Washington omnipotence has waned. Business men and trade organizations are finding more and more that the problem still is in their laps. They must learn how to live and work with their competitors, their workers and their customers without governmental pressure. The most hopeful sign of returning sanity in NRA matters is the eclipse of collegiate consumer champions and panty-waist planners.



Navy and Marine Memorial Is Cast of Aluminum

By T. D. STAY
Aluminum Co. of America

ONE fine morning in May, 1893, a group of English gentlemen excitedly were watching Sir Alfred Gilbert, British sculptor, in his London studio on the Kensington Palace road. A statue of Eros, the artist's latest work, had just come from the foundry. Protective wrappings still covered the figure, recumbent in a dark corner of the room. Its wings, lying alongside, had not yet been mounted.

"It's too dark here," said Sir Alfred, leaning over the figure. "We can see it better near the light. I'll just move it over."

With that he stooped, threw one of the statue's legs over his shoulder, lifted the entire casting on his back and carried it to the window. The assembled company marveled. Who was this man strong enough to carry a cast statue from one side of the room to the other? Sir Alfred proceeded to unwrap the figure. The statue which emerged was grayish—possibly the color of old silver. Sir Alfred, reading the thoughts of his visitors, smiled. One of them suddenly exclaimed:

"I know what the statue's made of! It's made of this new light metal, aluminium!"

Sir Alfred beamed recognition. It was aluminium (as aluminum is called in Great Britain), and he was the first to use it as a statuary metal. The figure was to top the Shaftesbury Memorial Fountain in Piccadilly Circus, and was to be erected to the memory of the philanthropic and beneficent Anthony, 7th Earl of Shaftesbury, who died in 1885, and whose benevolences were remembered by thousands of Englishmen.

When Eros was cast by Messrs. Broad, Salmon & Co. the use of aluminum as a statuary metal was unheard of, and aluminum itself was much of a novelty, as only a few years before it had been made commercially available through the

2

discovery of an inexpensive method of production.

It is the peculiar virtue of aluminum that a fine oxide film is formed on its surface almost immediately after it is exposed to the air. This oxidization is not progressive, and the film serves to protect the rest of the metal. This held in the case of Eros, and London's fog and soot soon gave it an additional covering.

So Eros, who had been a bright and shining youth, turned darker as the years went by. In fact, many thought the statue was of black marble. It was re-discovered as an aluminum monument in 1925, when the statue was moved from the circus to the Victoria Embankment gardens while the Piccadilly Tube station was built. In 1931 the statue was returned to its original site, and it has been standing there ever since.

Eros has been the inspiration of other statues of aluminum, the principal of which is the *Navy and Marine Memorial,* recently erected in Washington in honor of those who served and are serving the country in all branches of sea duty. The memorial will be dedicated by President Roosevelt on Memorial day.

The monument, shown in Fig. 1, was erected on the Potomac river, near the Arlington Memorial Bridge. It is set on a base of seagreen granite. The casting depicts the crest of a wave, just breaking, over which seven sea gulls are hovering. The wing tip of the top bird, Fig. 1,

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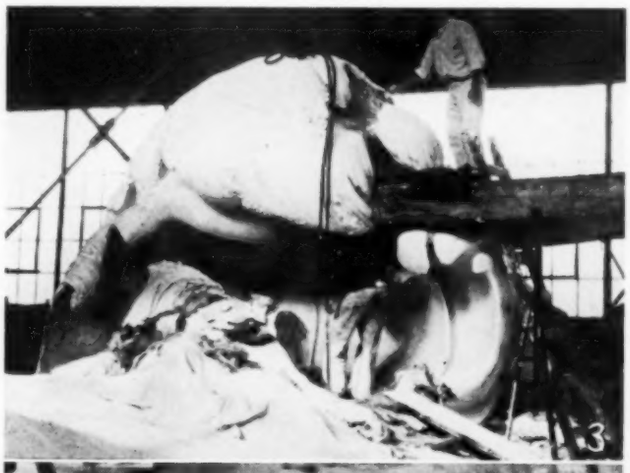
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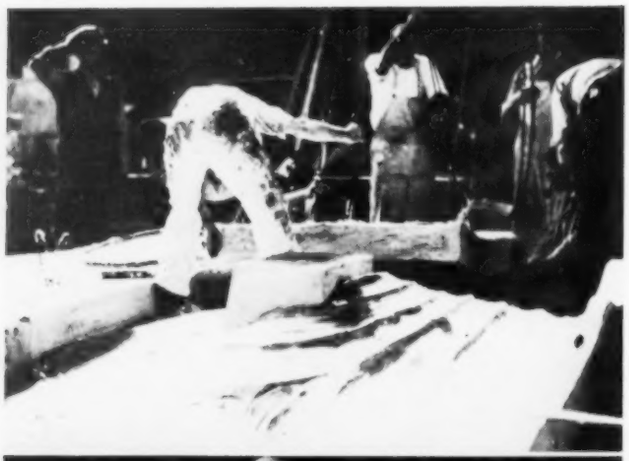
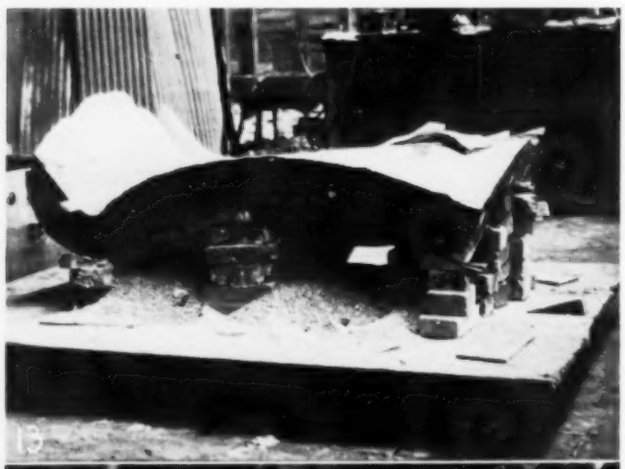
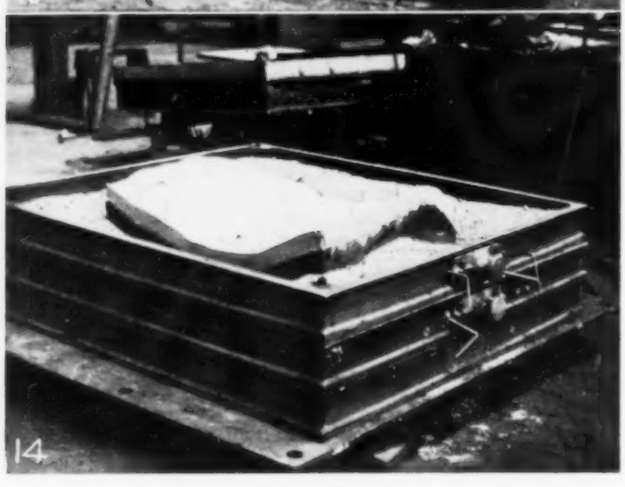


is 35 feet from the base; the monument proper is 30 feet long and 20 feet wide. The wing spread of the gulls is 6½ feet for the largest, shown at the bottom of the group, and 4½ feet for the smallest. The measurement of each bird from wing to tail is half the wing spread.

Conventional statuary casting practices were followed in producing the monument. More than 100 separate pieces were used in the assembly. First the original plaster model, made by Sculptor Begni del Piatta, was taken and reproduced in full size. The completed plaster model of the wave is shown in Fig. 2. The scale of the original model was 1 to 6. After the full-size plaster model was made, as shown in Fig. 3, it was laid out into sections for the pouring of plaster forms. After the wood forms were completed, as shown in Fig. 5, reinforcement wires were set in place just before the plaster was poured for the mold, which forms the negative pattern of the monument. The pouring operation is illustrated in Fig. 6.

Molds for small pieces, hard to duplicate because of design and intricacy, were made with glue, Fig. 7, which, because of its rubberlike qualities, could readily be removed and used as a pattern for the negative plaster. Several finished negative plasters after removal of wooden forms and before being removed from the model are shown in Fig. 8. Fig. 9 shows the removal of the negative plaster sections. The section

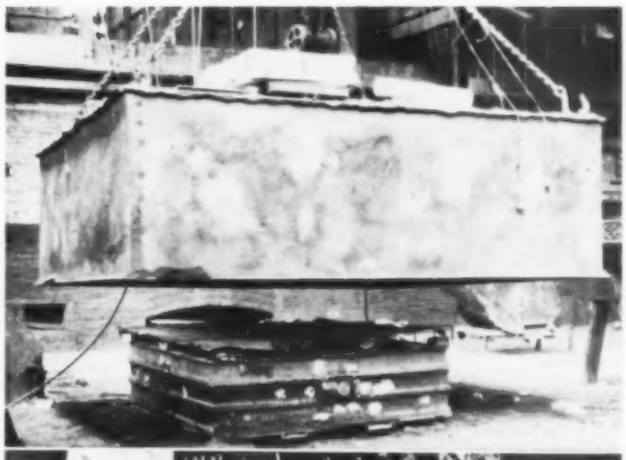




illustrated forms the drag of the mold for reproducing a section of the final casting. The small square block in the foreground of Fig. 9 is a glue mold in place.

When the plaster sections were completed, they were dried thoroughly prior to building up the mold. Fig. 10 illustrates the method of preparing the plaster for baking. To facilitate this drying, aluminum plugs, or pins, were inserted in the rear of the sections into a number of holes provided for them. The high thermal conductivity of these aluminum pins permits the interior of the plaster to be dried quicker and more evenly. The drying was carried out in large gas-fired core ovens.

After the plaster had been dried and removed from the baking oven, as illustrated in Fig. 11, a layer of clay, comparable to the metal thickness desired, was laid on the surface. A section of the negative plaster partially clayed out is pictured in Fig. 12. In a casting of the size required this thickness had to be from $\frac{3}{8}$-inch to $\frac{1}{2}$-inch. Fig. 13 shows a plaster section completely clayed and set on the follow board for the construction of the mold. In this condition, the plaster was set in a suitable flask and backed up with aluminum borings. Wood forms were next attached to provide flanges integral with the casting, as shown in Fig. 14. The mold was then filled with a core sand mixture to the parting line, as illustrated in Fig. 15, thus com-



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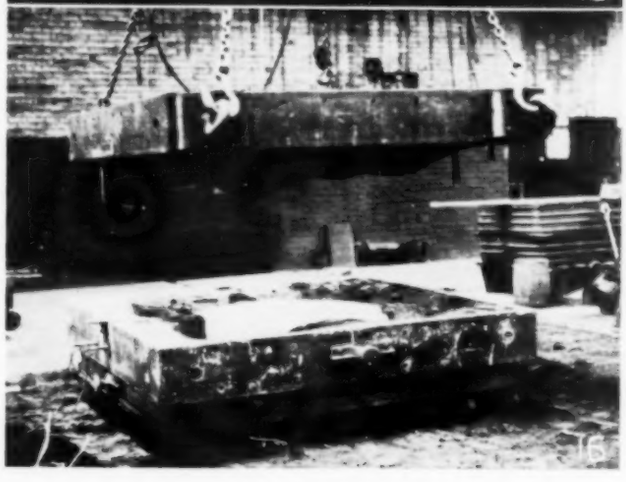
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pleting the drag part of this particular mold.

The cope half, or upper half, of the mold was made up in the usual way, again using a suitable core sand mixture. On removal of the cope, Fig. 16, the clay and wood forms were taken off. With this operation the mold was completed and ready for preheating and pouring of the metal.

The furnace used for the final preheating was movable and suspended over the casting by a traveling crane, as illustrated in Fig. 17, because plaster castings are fragile and must remain stationary. The furnace is fired by gas, and its temperature is controlled by thermocouples embedded in the plaster. The leads from the thermocouples may be seen in Fig. 16. The sides of the furnace are steel, and after it had been lowered around the flask, sand was banked up against the sides to prevent any heat from escaping.

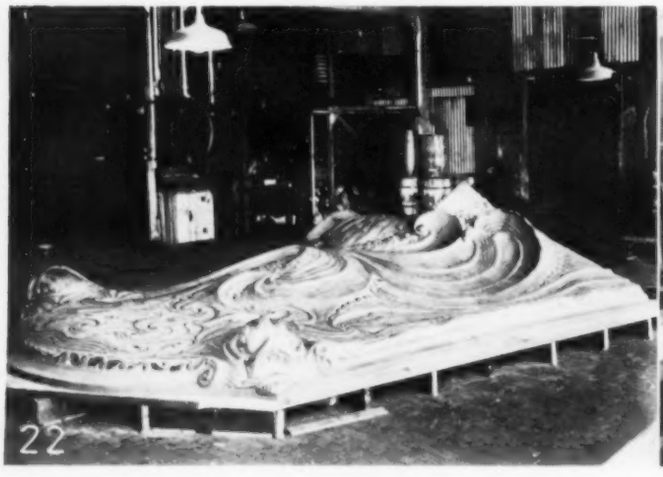
Some of the plaster sections, because of their intricacy, required the use of the *lost wax* process for reproduction. Such molds were prepared in the usual way, using agar agar. After the plastic casting was finished, an impression was made with it in the sand, which was to form the mold for the final metal casting. The metal was then poured and cooled, and removed from the flask. The casting now was ready for the final touches.

Tapered steel plugs were used to line up the sections during assembly. These plugs later were replaced with bolts. The joints on the front surfaces of adjacent castings have small lips, which can be peened into any irregularities of contour, thereby producing joints which are practically invisible. After preliminary assembly, Fig. 18, the sections were hand-chased, Fig. 21, and sandblasted. The highlighting after sandblasting was done with portable rotary polishing wheels. Fig. 19 shows a typical joint on the front surface of the assembly prior to finishing while Fig. 20 shows the same joint after the joints were finished and the sections completely chased.

Color Finish the Surface

The final operation consisted of applying an alumilite finish, and required the splitting up of the statue into sections which were small enough to fit into the available equipment. A partially completed section ready for disassembling is shown in Fig. 22. Alumiliting consists of producing a thin but durable oxide coating, which subsequently is impregnated with metallic pigments of the desired color. A section of the department for performing that operation is shown in Fig. 23. Variation in color is imparted by the manner in which the various parts are buffed. The appearance resulting from this finish is quite effective. The wave and the undersides of the gulls are green, and the effect of sunlight falling on the group is given by the golden highlights on wing tips and crest.

The memorial now (*Please turn to page* 52)



Propose Steps To Speed Recovery

Speakers at Nationl Founders' meeting suggest less government in business

REMOVAL of legislative restrictions on industry, clarification of existing regulations and acceptance of a policy by the federal administration that new laws be mutually beneficial to both business and labor, were proposed at the 38th annual convention of the National Founders association at the Waldorf-Astoria, New York, Nov. 14-15. Several speakers discussed the political situation and offered concrete suggestions on legislation tending toward improved business recovery. The convention was attended by 200 members and guests.

Officers were re-elected as follows: President, Thomas W. Pangborn, Pangborn Corp., Hagerstown, Md.; vice president, F. H. Clausen, Van Brunt Mfg. Co., Horicon, Wis.; commissioner, A. E. McClintock, Chicago; secretary-treasurer, J. M. Taylor, Chicago. New members of district committees include: First, Thorwald F. Hammer, Malleable Iron Fittings Co., Branford, Conn.; second, W. H. Cole, Moore Bros. Co., Elizabeth, N. J.; third, D. C. Bakewell, Duquesne Steel Co., Pittsburgh; fourth, Ferris Taylor, Dean Bros. Co., Indianapolis; fifth, H. E. Muchnic, Locomotive Finished Material Co., Atchison, Kans.; sixth, L. S. Peregoy, Sivyer Steel Casting Co., Milwaukee; seventh, C. A. Brainard, Beaumont Iron Works Co., Beaumont, Tex.

President Thomas W. Pangborn, in opening the convention with a strong address, submitted definite proposals as to federal government policy for the attainment of recovery, concluding with:

We must balance the federal budget, for business can find no encouragement in a tendency toward financial instability in government. We must reduce federal relief. Reduced expenditures and a sound financial program would be the go-ahead sign for business which is the real method of affording unemployment relief.

We must stabilize our currency. Business is ready to contend with economic hazards but it cannot gamble with political hazards.

Government must remove itself from the field of competition with its own citizens and taxpayers.

Government must discontinue the policy of construction of public works projects in fields already amply served by private enterprise.

A labor truce should be declared. This is no time to attempt innovations in labor relationships, and section 7a has not clarified those relationships. Instead, the experience of confusion, destruction, loss of capital and wages thus far only tends to retard recovery.

Let us maintain a status quo: Whatever has been the method of bargaining with employes, whether closed shop, open shop, individual bargaining, or employe representation plan, let it remain as it is with neither employers nor employes seeking to take an advantage of unusual conditions. That would put a stop to this agitation and endless argument and attention should be centered on the real objective, namely, that of stimulating national business recovery.

Our present sensitive economic machinery should not be made the occasion to promote the interests of any special group. Maintenance of status quo in labor relations at this time would do much to steady our commercial and industrial ship. Upon its progress all must alike depend. Labor cannot sink capital without sinking itself also.

These are steps which it seems would encourage the investment flow of private capital into the industries of the country, restore confidence, stimulate industry and commerce, and bring us back to our normal American life.

As a result of the recent elections, the administration probably is more seriously concerned with the basic fact that the problem of recovery still faces the nation than before the poll, according to Virgil Jordan, president of the National Industrial Conference board.

Business improvement will not be permanent until a less unfavorable attitude is imbedded in government's policy toward industry, in Mr. Jordan's opinion. The administration can no longer rest its case on the errors and deficits of the individual business man and business in general.

Re-employment by private enterprise depends on a simple economic factor, reduction of operating cost. However, every move by the administration has been against this. Mr. Jordan suggested government loans for payrolls could be made without adding to unit costs. This would add employment, and administration of the same could be administered by code authorities.

As to new legislation in the next congress, he suggested retention of NRA without change with the hope that its ad- *(Please turn to page 52)*

Fig. 1 —Removing a casting from the mold. Illustrations courtesy Bethlehem Steel Co.

Cast Large Bronzes Centrifugally

Three special machines employed to produce nonferrous castings in wide range of sizes

By EDWIN F. CONE

SOME 15 to 20 years ago the centrifugal casting of metals was largely in the experimental stage. Today it is an established commercial process for the production of certain iron and nonferrous products.

Several American engineers have been pioneers in the development of that industry. The name of de Lavaud is internationally known. To his early efforts in this country credit must in a large measure be given for the establishing of the centrifugal casting of cast iron pipe. Probably from 80 to 90 per cent of this country's production of such pipe is made by one centrifugal process or another—the de Lavaud or the Sand Spun methods.

Practiced in Several Plants

In the nonferrous field some noteworthy advances have been made in recent years. In several of the navy yards of the country certain meritorious results in centrifugal casting have been obtained. Commercial production of large cylinders and similar shapes of brass, bronze, and other nonferrous alloys has for some time been achieved by the Bethlehem Steel Co., Bethlehem, Pa. That company has a special foundry devoted to that work at its Bethlehem plant.

Recognizing the possibilities of the centrifugal casting of nonferrous metals, a few years ago the Bethlehem company gradually converted a portion of its sand mold brass foundry into the present modern centrifugal department. In that department centrifugal castings are being made regularly of brass, bronze, or special alloys in any standard mixture. Special acid-resisting

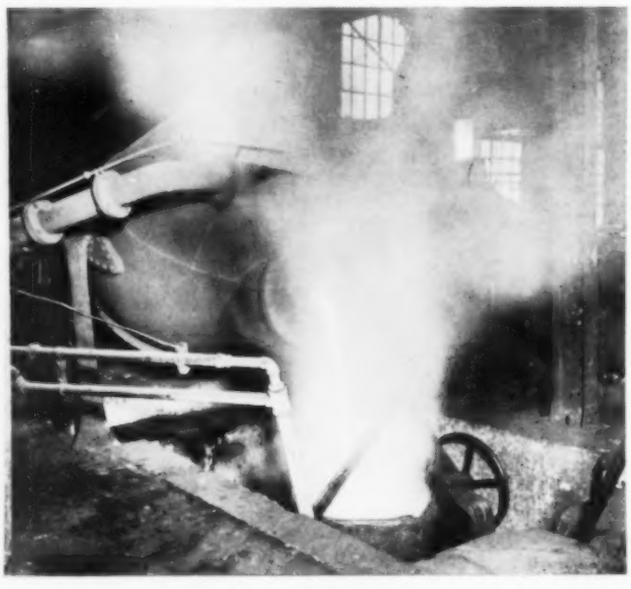


Fig. 2—Pouring a heat of melted brass from a teapot type furnace into a ladle preliminary to casting

or noncorroding compositions also are produced.

Before discussing some of the features and products of that department, a few words concerning the principles and advantages of the centrifugal process itself should be given. The principle of the process is simple and generally is known. Hot metal is poured into a rapidly revolving mold so that the centrifugal force throws it against the inside surface of the mold. It is held there by this force until it solidifies.

Whether cast iron, brass, bronze or any other alloy is used, the result is a product of uniform, close, dense structure free from segregation and porosity. Dust, slag or other impurities collect on the inside surface of the casting.

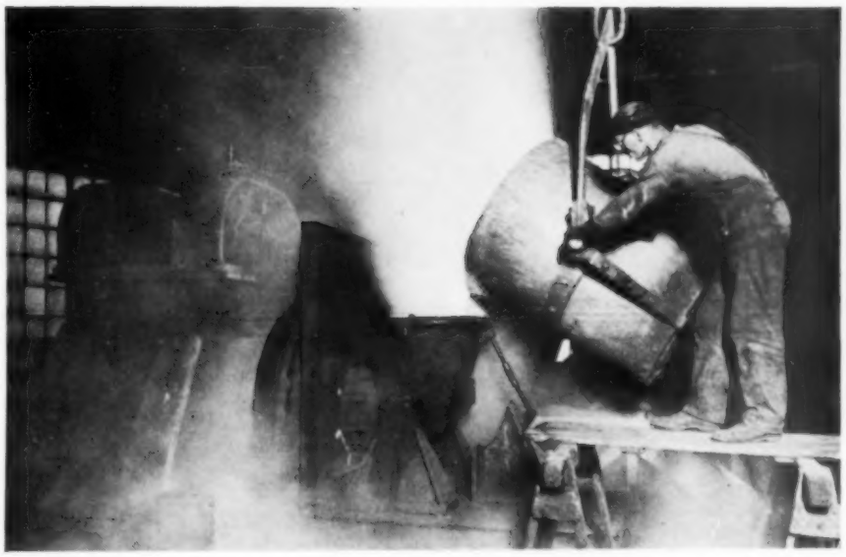


Fig. 4—Molten metal is introduced into the revolving casting machine through a special spout or trough

Size is a striking feature of the Bethlehem foundry's cylindrical products. They vary in outside diameter from 6 to 48 inches and in lengths up to 288 inches or 24 feet—a truly remarkable range. Any product within these dimensions, from the smallest to the largest can be made. Though cylindrical, some are cast with flanges.

To produce such a broad variety of castings the centrifugal casting equipment of the foundry consists of three large centrifugal machines as shown in Fig. 3. One handles molds which produce castings from 6 inches to 14 inches, outside diameter. A second machine makes 14-inch to 24-inch castings and a third, the largest, is capable of casting products from 24 inches to 48 inches, outside diameter. The molds are specially designed and are revolved at the necessary varying speeds by electric motors.

The revolving molds are sand lined. A wooden pattern is used to form the lining of the mold. Properly prepared sand is rammed in between the pattern and the metal mold. After drying and other treatment, the revolving mold is ready for insertion in the centrifugal machine. Molten metal is poured into the mold as it revolves by a specially designed trough and the casting is produced. The mold is withdrawn from the machine and the casting removed.

The melting equipment for the various alloys consists of downdraft furnaces and of regular pit furnaces. Three down draft furnaces, two having a capacity of 5-ton and one of 1½ tons are used. There are also nine 650-pound crucible, gas-fired furnaces. The accompanying illustrations represent various steps in the process.

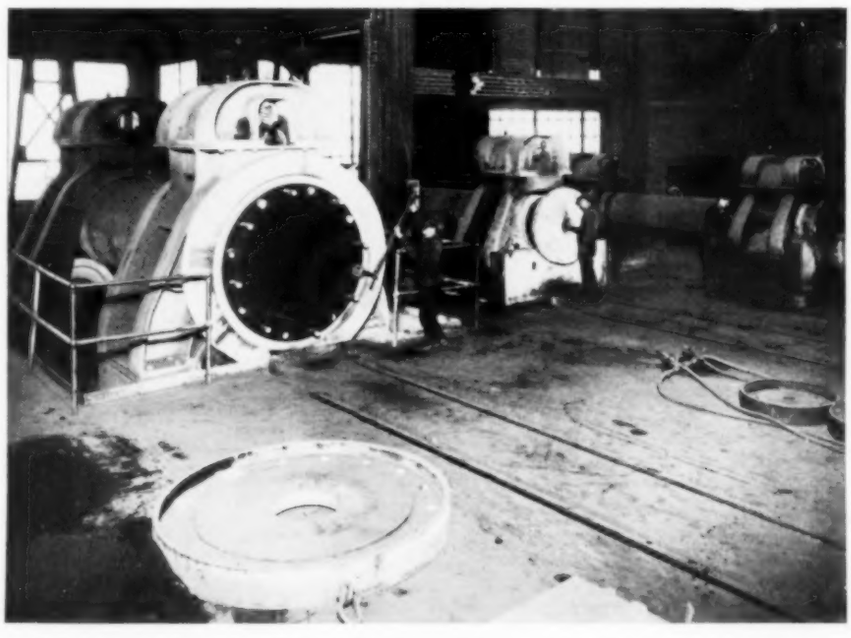


Fig. 3—Three of the specially designed centrifugal casting machines for producing products in various sizes of brass and bronze

Cylinders and other products can be made of brass, bronze and special alloys, in any standard mixture, or in special acid-resisting or noncorroding compositions.

Castings made in this foundry are being used in many branches of industry. Some of the leading applications include: Ship construction, paper and pulp mill machinery, chemical plant equipment, textile machinery, hydraulic equipment, liners for pumps and presses, driers, mining machinery and co' works equipment. (*Please turn to page* 58)

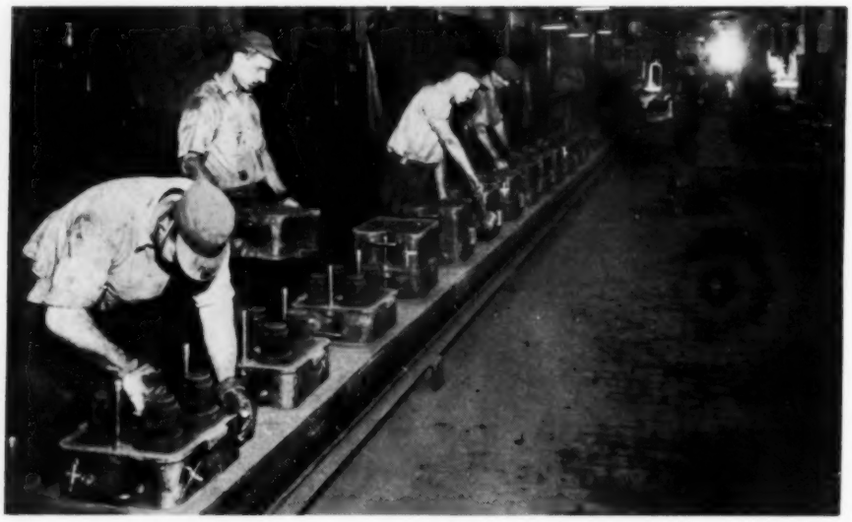


Fig. 1—Green sand cores in pistons form part of the drag

Foundry Doubles Plant Capacity

Daily production of gray iron castings reaches peak never foreseen originally

By PAT DWYER

IN A survey conducted by THE FOUNDRY several years ago over a wide list of casting shops the accumulated figures showed that a floor space of 400 to 1000 square feet is required for the production of a ton of castings. Total number of employes per ton of castings produced ranged from 5 to 15. Introduction of mechanical equipment in recent years has resulted in radical revision in these figures.

An outstanding example of intensive production methods is presented in the Chevrolet gray iron foundry at Saginaw, Mich. The floor area devoted to molding activities is 336 x 384 feet, or 129,024 square feet. Approximately 2000 tons of iron are poured by three shifts in the 22½-hour day. This works out at the rate of 64.51 square feet of floor area per ton of iron poured. Even were the operations divided by three to compare with the single shift system which generally is observed in the foundry industry, the figures still are impressive. On a basis of 666 tons the floor area per ton of iron is 193.7 square feet.

Referring to Fig. 6 in the first article in this series, published in the October issue of THE

Fig. 2—Piston making machines are arranged in pairs under sand chutes

FOUNDRY, it will be noted that the molding department occupies the central space in the general layout. It is bounded on the east by the melting department, on the north and south by the coremaking departments and on the west by the shakeout. A driveway separates the main group of buildings from the cleaning department still further to the west. Core making and cleaning will be taken up later.

Molding activities are pursued in a group of 14 units, arranged in parallel lines extending from a gangway in front of the cupolas at the east to another gangway at the west where the castings are picked up and taken to the cleaning department. The smaller castings are conveyed in steel buckets on overhead conveyors while the larger castings, cylinder blocks and heads are attached to hooks on an aerial conveyor arranged in a series of long loops. The rate of speed has been regulated so that the castings arrive in the cleaning room at a temperature at which they may be handled without discomfort.

Fig. 4—The plate which closes the opening in the flask is provided with vent holes. The edges are daubed with clay

Each of the 14 units is complete in itself to the extent that it is provided with a battery of molding machines, a power driven conveyor, a pouring station, shakeout equipment and sand supply system. Ultimate production capacity of each unit is limited by the length and speed of the conveyor, but any intermediate production is secured by operating any given number of molding machines in the battery. This provides the necessary elastic feature to cope with changes in production schedules and with minor emergencies.

With the exception of the piston molding machines, all the molding machines were supplied by two prominent manufacturers of that line of equipment. Explanation for this choice is that it is easier to train men on one class of machines, also that the maintenance gang experiences less trouble in keeping machines in good running order where the types of machines are uniform. Number of repair parts kept in stock is held to a minimum. Another reason is that a great deal of duplicate pattern and flask equipment is required on account of the heavy tonnage on a comparatively small number of different castings.

Several factors in the composition and preparation of the sand affect the casting finish or surface appearance. Coal dust is ground on the premises to a fineness of 180 mesh. Experience seems to indicate that the most important factor is a smooth flowing sand that rams well around the pattern and this in turn is influenced by the bond or clay content and the grain distribution. For example a sand with a fineness average of 60, A.F.A. standard, does not necessarily insure a good finish after continued use. In fact it has been found that sand of 80 mesh and finer is the chief cause for sand becoming coarse and not flowing freely. As a result the mold surface is porous and the casting surface is rough. A

Fig. 3—Molds for cylinder blocks are assembled progressively under critical inspection on a moving conveyor

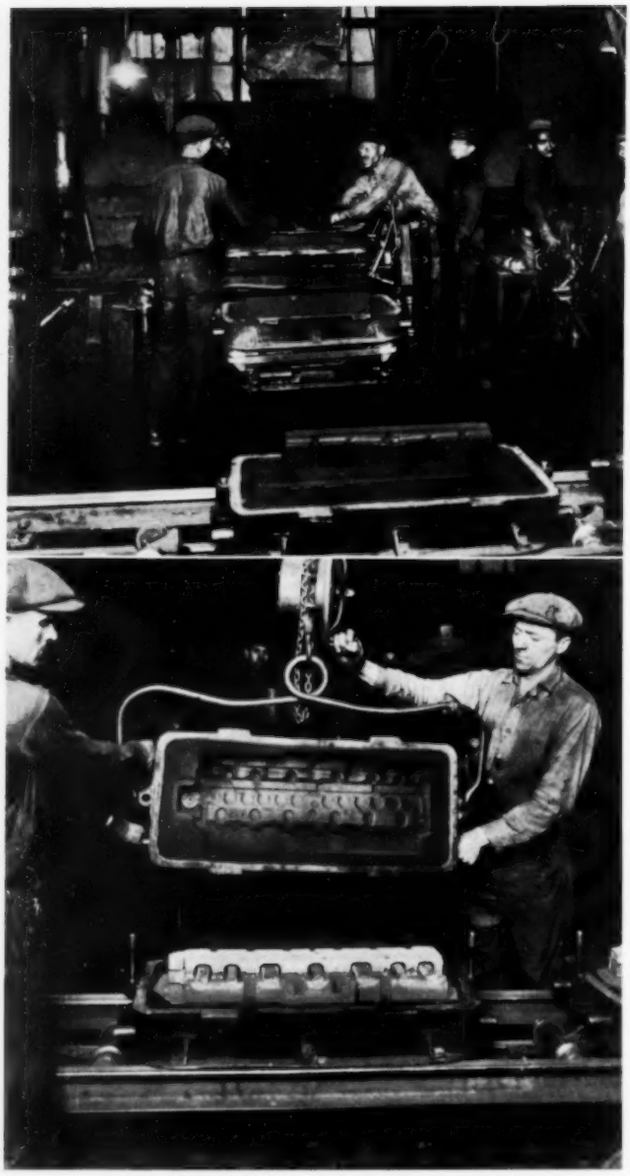


Fig. 5 (Above)—Metal enters the cylinder heads from the top and bottom at one side. Fig. 6 (Below)—Copes are lifted with a spring bail which engages small hollow trunnions

better finish is secured with a sand in which all the grains are nearly the same size even though the fineness number is considerably below 80.

Reference already has been made to the method of disposing of burned core sand and other refuse from the shakeout stations. The large pieces are crushed, metal inclusions removed by magnetic separator and the resulting material dumped in a water tank. As a thin slurry it is pumped through a long pipe line and distributed over part of the company's vacant property. This reclaimed material forms 95 per cent of all the bonding sand mixtures used in the foundry. A typical rebonding mixture contains: Reclaimed sand 300 pounds, clay bond 132, seacoal 60 pounds.

This material is mulled for 5 minutes and then is ready for use as a reviving agent, to maintain strength, necessary seacoal content and volume of sand in any given molding unit. Naturally the proportions of the various ingredients vary to some extent depending upon the shape, size, thickness, etc., of the castings on which the sand is to be used.

Sand mixtures have been standardized to the extent that six different bond mixtures meet all requirements. The various mixtures are stored in 12-ton hoppers and conveyed by truck when required to rejuvenate the sand supply over any of the molding units. Sand from each system is tested every hour for strength, permeability and moisture. The combustion method is employed for testing the seacoal content every 3 hours. Mixture specifications for sand on several types of castings are shown in Table I.

Sand for Different Castings

Facing sand contains a little more coal dust than the backing sand and in addition is treated for 5 minutes in a muller before it is distributed to the molding stations. Permeability is highest and moisture is lowest in the sand for the piston castings. Sea coal content is highest on the oil pump casting, a small thick casting of irregular shape. All tests are conducted according to standards established by the American Foundrymen's association.

Cylinder block castings are molded and cast with the barrels in a horizontal position. For convenience in handling, the combined upper crankcase and barrel core for the six-cylinder casting is divided in two, that is three barrels in each unit.

Molds are placed on the conveyor and assembled in transit in the manner that has become familiar in the foundry industry in recent years. Drag machines are grouped near the end which marks the beginning of the conveyor unit. A small jib crane with an air hoist swings the drag from each machine to the conveyor. The various cores are placed in position and tested for accuracy by a number of men stationed alongside the conveyor in the space between the drag and cope molding machines. Copes from the battery of cope ma- (*Please turn to page* 55)

Table I

Specifications for Sand Control Tests

Casting	Sand	Strength	Permeability	Moisture	Seacoal
Cylinder block	Backing	2.0 - 2.2	65 - 80	5.0 - 5.4	9.0 - 10.5
	Facing	2.2 - 2.4	65 - 80	5.0 - 5.4	11.0 - 12.5
Pistons	Backing	2.0 - 2.2	75 - 90	4.4 - 4.8	7.5 - 9.0
	Facing	1.8 - 2.0	65 - 80	4.0 - 4.5	6.5 - 8.5
Flywheels	Heap	2.1 - 2.3	65 - 80	5.0 - 5.4	9.0 - 10.0
Oil pump	Facing	2.2 - 2.4	60 - 75	5.0 - 5.2	11.0 - 12.0
Impeller	Heap	2.0 - 2.2	60 - 70	4.2 - 4.4	5.0 - 6.0

Copper Aids Grain Structure

Solubility of the alloy in cast iron influenced greatly by other elements

CONSIDERABLE interest has developed recently, both in this country and abroad, in the use of copper as an alloy in the production of high test cast iron. Much experimental work is being carried on and in numerous instances the alloy is being employed on a commercial basis in the production of certain types of castings.

The accompanying illustrations show the structure of a high test cast iron produced by the Allis Chalmers Mfg. Co., Milwaukee, under the direction of Ralph S. MacPherran. The metal has the following analysis: Carbon 2.70 per cent, silicon 2.01 per cent, sulphur 0.087 per cent, manganese 0.69 per cent, nickel 0.12 per cent, copper 1.15 per cent. It has a tensile strength of 70,050 pounds per square inch and a brinell hardness number of 285. The micrographs show a good grain and the alloyed iron provides the characteristics for machinability.

J. E. Hurst, in a paper "Additions of Non-ferrous Metals to Cast Iron," which was presented before the Newcastle branch of the Institute of British Foundrymen recently, pointed out that there are a number of interesting features in conjunction with the addition of copper to cast iron. Actually that element occurs in ordinary cast iron more frequently than generally is supposed. Many brands of Continental pig iron, according to Mr. Hurst, contain as much as 0.75 per cent copper, and he frequently has encountered castings containing that amount of copper. When it is considered that the maximum amount of copper capable of being dissolved in ordinary cast iron is only somewhere between 3 and 4 per cent, 0.75 per cent can be considered a substantial amount.

Mr. Hurst pointed out that the solubility of copper in cast iron alloys is influenced much by the presence of other (*Please turn to page* 56)

Micrographs of high test copper cast iron having a tensile strength of 70,050 pounds per square inch. The metal shows a good grain structure with fair machinability

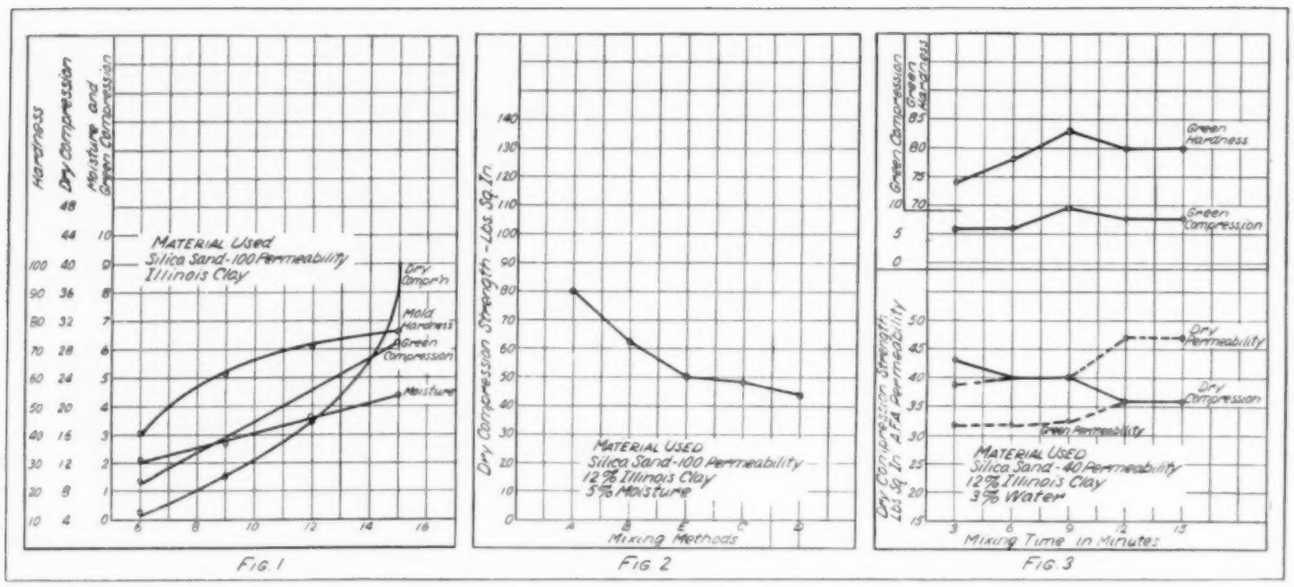


Fig. 1—Effect of clay contents on green and dry properties of molding sand. Fig. 2—Effect of mixing methods. Fig. 3—Effect of mulling time

Controlling Dry Sand Strength

Reduce cost and lower losses by checking trend of that factor at least once a week

By H. W. DIETERT and F. VALTIER

CONTROL of dry sand strength is an important phase of sand control and offers a virgin field for practical application and research. Methods which are in practical use for controlling dry sand strength are as follows: Mixing; the additions of water, pitch, cereal binders, bentonite, plastic clays, and molding sands of high dry sand strength.

Quantity of clay bond added to a sand mixture or contained in natural molding sand has a material effect on the dry sand strength. This is illustrated graphically in Fig. 1, which shows an increase of dry compression strength from 4.5 to 40 pounds while the clay content is increased from 6 to 15 per cent. This relation also establishes the fact that as the green sand strength increases the dry sand strength will increase in value.

Manner in which a sand is mixed has much to do with the dry sand strength, both as to the method or type of mixer and as to the duration of mixing. A graphical illustration of the influence that method of mixing has on dry sand strength of a synthetic clay bonded sand is shown in Fig. 2. Mixing method *D* gives a minimum of 44 pounds per square inch dry sand strength, while method *A* gives the maximum of 80 pounds per square inch. It is evident that by selecting a different mixing method the dry sand strength may be raised or lowered as may be required.

Duration of mixing has its effect on both green and dry properties of molding materials. A graphical illustration of the properties of a clay bonded molding sand mixed different lengths of time is shown in Fig. 3. Green strength and the mold hardness of the sand show the same trend, having a maximum value at 9 minutes of mixing. Green and dry permeability are affected alike, showing an increase up to 12 minutes of mixing.

Dry compression strength of clay bonded sand decreases as the time of mixing is increased beyond 9 minutes. After 12 minutes of mixing, the time of mixing did not affect any of the sand properties, due probably to the fact that at 12 minutes of mixing the processing was completed and no further rearrangement of sand is made.

Moisture content of a molding material is one of the largest controlling factors of dry sand strength. A low moisture content results in a low dry sand strength while a high moisture will result in a higher dry sand strength. This fact is shown in Fig. 4, illustrating the relation between moisture content and dry sand strength of a clay bonded synthetic sand. The dry sand strength increases with each increase of moisture, while both green strength and mold hardness are low at extremes of moisture content range.

Increase the Moisture Content

This relation is put to practical use to control dry sand strength by so changing the clay substance content in the molding sand that either a higher or lower moisture content will give a tempered sand. For example, it is desired to increase the dry sand strength of a production sand. Green strength may be decreased to a minimum as permitted by flask and molding equipment. This reduction in clay substance will allow an increase of moisture content to well temper the sand, thus increasing ultimate dry sand strength.

Fogging of sprues and other methods of adding moisture to certain parts of a mold often are employed to secure clean castings. This procedure increases the dry sand strength of the portion of the mold thus treated.

Dry sand strength of molding sand may be increased quickly by small additions of pitch

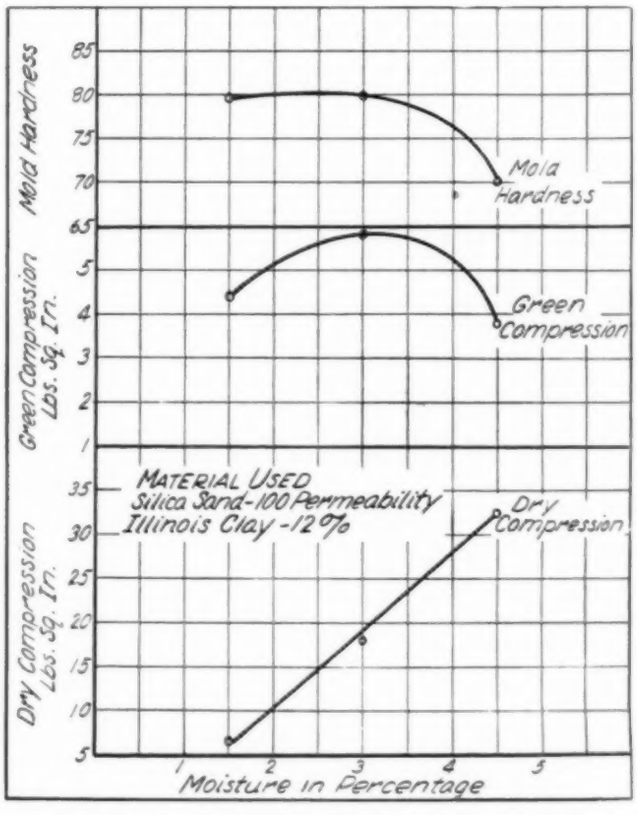


Fig. 4—Effect of moisture on green and dry properties of molding sand

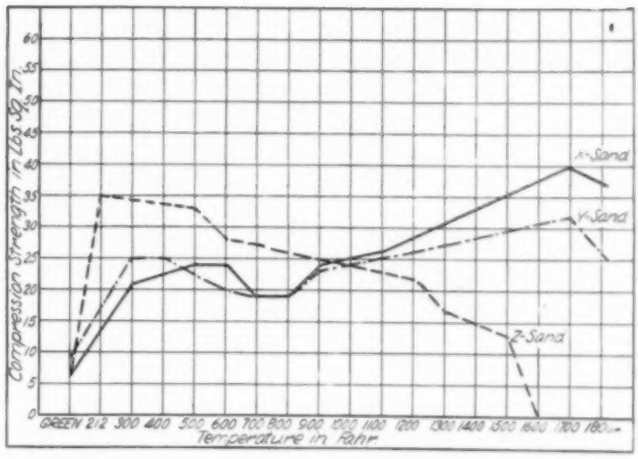


Fig. 5—Effect of temperature on bonding properties of molding sand

binder. That material also acts as a facing material. Care must be exercised in its use to avoid the pitch binder making the sand water short.

The well-known list of binders made from corn and wheat often are used in sand mixes for baked cores and dried molds. However, some use of these binders is made in green sand facing mixes, particularly in steel foundries. These binders prevent sand drying out, act as facing materials and increase the dry sand strength. Their dry sand strengths fail at a relatively low temperature, which requires that other materials must be present to impart dry sand strength at elevated temperatures.

It has been a time honored practice to add sugar and molasses to molding materials to prevent cutting or washing of mold surfaces, whether for green or dry sand molds, by increasing the dry sand strength. Similar to cereal binders, these two materials lose their dry sand strength at moderately low temperatures.

Clay Increases Sand Strength

Bentonite has proven an effective means of increasing both the green and dry sand strength of molding sands. Using a moderate portion of that material with some other bonding material, as natural molding sand, has proven a practical method of controlling the dry sand strength. The dry sand strength of that material diminishes at elevated temperatures.

Bonding clay made of pulverized plastic fine clays has won a recognized position as a practical bonding material. A number of these clays possess a property which increases the dry sand strength of molding sand markedly. They excell in the fact that they retain the dry sand strength at a much higher temperature.

A study of the dry compression strength curves in Fig. 5 reveals many interesting facts relating to the behavior of molding sand under high temperatures. The sand Z shows a sharp drop in dry sand strength at a temperature above 1500 degrees Fahr. The sand (*Please turn to page* 56)

Questions and Answers

Covering important problems found in all phases of modern foundry practice

This department includes problems relating to metallurgical, melting and molding practice encountered in making castings. Questions from subscribers addressed to the Editor of The Foundry will be answered by members of the editorial staff, supplemented where occasion requires by the advisory staff.

Uniform Charges of Coke Will Maintain Height of Bed

Many of our stove castings show what appear to be either cinder or gas holes. We enclose a typical charge sheet showing the composition and weight of the iron and coke in a 14-ton heat melted in a 48-inch diameter cupola.

The charge sheet shows a total of 11 charges, 10 of 2500 pounds each and the last charge 2900 pounds. Each charge is made up of 1500 pounds of pig iron and 1000 pounds of sprues with the exception of the last charge which contains 1400 pounds of sprues. To melt this iron you have a bed charge of 1600 pounds of coke, followed by 340 pounds, two 325-pound charges, two 320-pound charges, four 200-pound charges and one 175-pound charge. The last charge is nearly all old coke and the four preceding charges are half and half mixtures of old and new coke.

Without knowledge of the height of tuyeres we cannot decide whether the bed is too high or not, but from the fact that apparently the iron throughout the heat is hot enough to pour your castings, we are inclined to the opinion that the bed is too high. The succeeding charges are sufficient to maintain the bed at a suitable height for a considerable time, but the final five charges are not sufficient to melt the iron at the proper melting zone and as a result the iron is oxidized, a condition which shows up as small holes in the castings.

Where exceedingly hot iron is required, as in a stove foundry, a 2500-pound iron charge is a little too heavy for a 48-inch cupola. You will secure more satisfactory results with a 2000-pound charge. The bed charge of coke may be cut down to some extent, the exact amount must be determined by experiment. A uniform charge of 300 pounds of coke between the iron charges will maintain the bed at the proper height. A little experimenting may show that this amount may be further reduced, especially on the last two charges.

Improper Feeding Causes Difficulties in Brass Casting

We are sending two fractured sections of small brass castings. The piece marked No. 1 is that from a rough casting after cleaning, but before machining. The piece marked No. 2 is from one after machining. Note the grain structure difference between the two. The castings are machined rapidly, and become so hot that it is necessary to use a wrench in removing them from the machine. The mixture used is the 85-5-5-5 alloy.

Evidently you are under the impression that the difference of appearance in the two fractures is due to the heat developed during machining, but in this we cannot agree with you. The machined piece does not show any surface discoloration which might indicate the possibility of a decided change in structure due to heating although the temperature might have been such as to cause slight changes in structure that could be detected only microscopically.

The reason for a difference in fracture is that while the piece as cast indicates a solid casting, the machined piece is just the opposite. However, examination of both pieces under a low power magnifying glass shows that they both have the same defect, except that the machined piece exhibits it in a much greater degree. The trouble is caused by lack of feeding which, while supplying enough metal to insure a solid skin, does not supply enough metal to fill the voids in the central portion which form during the process of solidification.

In the case of the rough piece the dendritic structure containing the voids is quite narrow, but it is continuous, and on close examination by the naked eye is revealed as a fine yellowish streak. In the machined piece, the dendritic formation is much wider, and consequently more

easily visible. However, the pine-tree structure cannot be seen without the magnifying glass, and consequently the cause might be attributed incorrectly to improper mixing, or some such designation.

Since the trouble is due to inability of the interior of the castings to obtain liquid metal to replace that drawn away during solidification, the solution of the problem lies in an investigation of the gating and risering to insure that liquid metal is available until solidification is complete. Without knowledge of how those are accomplished at present, the only suggestion is to gate into the heaviest section. The light section freezes first, and naturally, cuts off any possibility of molten metal flowing through, even though heavy gates and risers be attached to such a section.

To Clean Gray Iron Castings by Pickling Process

We are planning to clean our monthly output of 30 to 60 tons gray iron castings by the pickling process. We shall appreciate any information on the best equipment and practice.

According to a prominent chemical manufacturer sulphuric acid loosens the sand by dissolving the iron from under it. Hydrofluoric acid dissolves the sand itself and therefore acts more promptly, takes much less acid and does not cause a loss of iron. For cleaning castings that are to be galvanized, tinned, enameled, nickel plated or painted, hydrofluoric acid is preferable to either sulphuric or muriatic acid. It leaves a purer metallic surface and does not rust the plating or work through the paint.

The strength at which a hydrofluoric acid pickle is used varies with the kind of iron to be cleaned and the time in which it is to be finished, but generally, it is used in the proportions of one gallon acid to 20 to 25 gallons water. The acid should be poured into the water and well stirred. Such a solution will clean ordinary castings in from ½ to 1 hour. If used at half strength, 1 gallon of acid to 50 gallons of water, the process will require several hours.

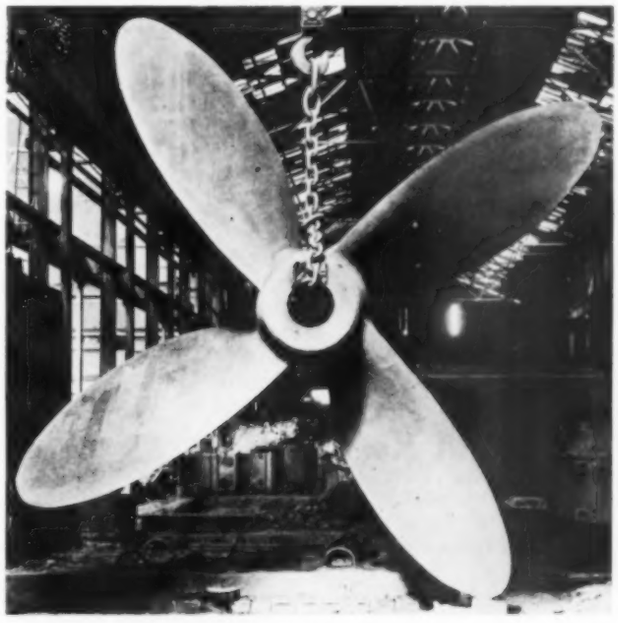
Hydrofluoric acid is used cold, but should be kept above the freezing point. The bath may be used repeatedly by adding about one-third the original quantity of acid before charging the new batch of castings. If it is desired to keep the iron bright it should be washed with water at about 200 degrees Fahr., immediately after coming out of the acid so as to dry quickly. By this means all trace of acid is eradicated and all chance of corrosion or tarnish resulting is prevented. If washed with cold water the casting will remain wet for some time and rust. A little lime may be added to the wash water.

Wood boxes with holes in the sides have been used with good results for immersing and removing castings from the bath. Sand is retained at the bottom of the boxes and is removed with the castings, thus saving the strength of the acid when not actively in use. Spent, weak baths should be discarded and the tanks cleaned every month. In removing stoppers from vessels containing acid, care should be exercised. Sometimes gas is generated from the action of the acid on the lead in which it is enclosed. This may cause some of the acid to be thrown out if the cork is removed hastily. The acid is neither explosive nor inflammable. Strong acid will cause inflammation wherever it comes into contact with the skin, therefore it should be handled as carefully as any other acid. Rubber gloves afford the best protection. Any acid splashed on the skin should be washed off with water and diluted borax or sal soda solution, or with aqua ammonia, which will prevent injury.

Scratch Vents Are Needed To Carry Away Generated Gas

Can you give us information on manufacturing brass brazed couplings which are used on hot water heaters? The analysis recommended is about 85 per cent copper and 15 per cent zinc, and from our experience, it is a little difficult to run this mixture.

More or less trouble is encountered in making castings containing fairly large quantities of zinc due to the fact that the low melting point zinc constantly is being volatilized at the temperature to which the alloy must be heated for



Solid, four bladed, cast iron propeller cast by Smith & Co. Ltd., South Shields, England. The casting weighs 16¼ tons, is 20 feet in diameter, and has a total blade area of 108 square feet. James Smith, of the company making the castings, was one of the overseas visitors to the Philadelphia foundry congress

satisfactory pouring. Some of the trouble can be eliminated by lavish use of scratch vents leading from the mold cavity to the outside of the flask. Such vents are fine enough to prevent entry of metal, but are large enough to carry away rapidly, the smoke and gases generated by the molten metal. It also is advisable not to have the metal hotter than needed to pour the castings successfully—and that temperature will have to be determined experimentally using a good pyrometer. Then use the pyrometer on every pot to see that the pouring temperature is correct.

Dry Sand Cores Used for Conveyor Screw

We understand that a special method has been developed for constructing molds for long steel conveyor screws. Can you furnish information on this subject.

In the method to which probably you refer and which is practiced in a prominent Mid-West steel foundry molds for conveyor screws are made in a number of dry sand cores. The cores are assembled in line on a suitable foundation inclined at an angle of approximately 20 degrees and the metal is poured through a gate at the low end. The molding and casting are exceedingly simple operations, but the preparation of the pattern involves some nice calculations and the most accurate construction.

Assuming that the screw is uniform in pitch and diameter throughout the entire length, the patternmaker decides on a length of corebox which in multiple will form the entire length of the casting. This box is open top and bottom, provided at one end with an extension bearing or guide for the end of a shaft and at the other end with a stripping plate through which the screw pattern is withdrawn.

The box is placed upon a core plate and the section of pattern is fitted in place. The box then is filled with core sand which is rammed to the required density either by hand or on a jolt machine. A wrench or crank handle is attached to the projecting end of the shaft and the pattern is screwed through the opening in the end of the box. The process is repeated until the required number of cores have been made. After the cores have been dried they are placed end to end and the joints are sealed. The metal then is poured into the cavity which extends from end to end. In some instances auxiliary pieces of pattern are attached to the inside of one end of the corebox to form a clutch or other form of driving device.

The method is extremely flexible and may be adapted to the production of combination right and left screws, small and large flanges, and intermittent flights on the same shaft. Naturally a separate pattern section, and—in some instances—a separate corebox must be provided for each change in section.

Pouring Temperature Varies with Composition

Can you tell us what is the exact temperature Fahr. or how high can the temperature on 85-5-5-5 ordinary red brass be before the metal is burned and the metal and castings injured? Also, give me the highest temperature Fahr. on 80-10-10, and 90-10 alloys. We use a pyrometer.

Your inquiry as it stands is rather difficult to answer, but perhaps the following information will be of value to you: Nonferrous metals and alloys should be melted as rapidly as possible in either a neutral or slightly oxidizing atmosphere, and after they are molten, should not be permitted to remain in the furnace any longer than is necessary. If the metal is allowed to stand in the furnace it tends to absorb gases of combustion usually with deleterious effect. At high temperatures generally, molten metal will absorb gases more readily than at lower temperatures—hence, the shorter the time the metal is in the furnace, the less gas it can absorb.

While troubles are encountered due to gas absorption, we believe that much difficulty usually attributed to burnt metal results not from improper melting, but from improper pouring temperatures. Examination of the structure of a fractured test or other piece, if one is familiar with the appearance of poorly cast bronze, will indicate whether the temperature was too high, too low or just right.

According to Dews a good sound bronze shows a fracture which is just sufficiently crystalline to be recognized as such, which shows a narrow blue skin where the metal has been in contact with the sand, and which is entirely free from red or brown patches. Low casting temperature leads to a cokey fracture without any definite signs of crystallization, and one which is discolored. High casting temperature produces coarse crystallization as well as discoloration.

Pouring range for 85-5-5-5 alloy is from 1950 to 2300 degrees Fahr., depending upon the section thickness. The 80-10-10 alloy pouring temperature will depend upon the amount of phosphorus present. Where phosphorus is used only as a deoxidizer leaving from a trace to 0.02 per cent in the alloy, the pouring range may be from 1900 to 2050 degrees Fahr. Where phosphorus is used as a deoxidizer and an alloy so that from 0.10 to 0.20 per cent is left in the metal, the pouring range will be from 1840 to 1900 degrees Fahr. When phosphorus is used as an alloy leaving from 0.50 to 1.0 per cent in the metal the pouring range will be from 1500 to 1680 degrees Fahr.

According to Dews the maximum tensile strength and elongation (green sand molds) of the 90 copper-10 tin alloy are obtained with a pouring temperature of 2100 degrees Fahr. However, the pouring temperature to be used will depend upon the section thickness, and you will as in case of any of the alloys mentioned have to determine the best pouring temperature.

Gives Analysis Of Scrap Car Wheels

We would appreciate information on the average silicon, carbon and manganese content of scrap car wheels; No 1 machinery cast scrap; clean automobile cast scrap, and No. 1 railroad cast scrap.

A definite anwer to your inquiry on the silicon, carbon and manganese contents of the various materials enumerated is difficult, for much will depend on the section thickness of the castings involved, and the variations from foundry to foundry. In general, car wheels will contain from 0.45 to 0.75 per cent silicon, from 0.50 to 0.75 per cent manganese, and a minimum of 3.25 per cent carbon.

We believe that in general, the remaining scrap materials will range from 2.00 to 2.50 per cent silicon; 0.50 to 0.70 per cent manganese, and around 3.40 per cent carbon.

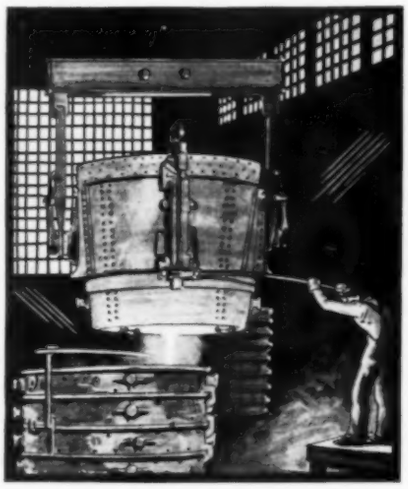
It is advisable, since you undoubtedly have a laboratory, to go over your various scrap piles and select a representative sample including all thicknesses. Analyze the drillings, and use the figures obtained. Also it might be pertinent to call attention to the advisability of analyzing for chromium and nickel, particularly in the automobile scrap.

Lacquer Prevents Corrosion on Castings

Can you tell us what kind of material is used by hollow ware manufacturers to coat their castings and thus keep the surface bright and clean until these castings finally are delivered to the householder?

The coating usually applied to cast iron cooking utensils is known as *spider* lacquer and may be ordered from any of the large paint manufacturers. This lacquer is further diluted by the addition of a suitable thinning agent. Naphtha is employed in some instances, but in recent years the oil companies have developed a thinner which eliminates the fire hazard. Local conditions including the daily volume of castings will determine whether it is more advantageous to dip the castings or spray them. Incidentally it may be of interest to note that hollow ware to be plated with chromium or nickel is not treated with lacquer or any other protective coating.

Viewing Foundry Developments



At Short Range

EXTENT to which green sand may be manipulated to withstand severe service is exemplified in an Eastern foundry engaged in the production of tunnel segment castings. The sand is rammed so hard in these molds that a man may walk over the surface of the raised mound in the drag, which is not reinforced with bars, rods or any other device. These hard molds produce castings accurate to size, shape and weight and without scabs or blisters.

♦ ♦ ♦

Among the advantages claimed for hot blast in the cupola are a decided reduction in the volume of coke required, a lowered blast pressure and a softer iron than is secured by the use of similar material in a cold blast cupola.

♦ ♦ ♦

TAPPETS have been made from electric furnace iron with a tensile strength of 41,000 pounds per square inch, a chill of 0.100-inch at center and full chill at edges without a sharp chill line. Charge consisted of bessemer pig iron 20 per cent, steel scrap 72 per cent; cast iron scrap 8 per cent. Total rejection for all causes was 4.5 per cent.

♦ ♦ ♦

Chromium is added to cast iron in amount up to 35 per cent. Up to 1 per cent is used to increase hardness and strength either with or without other alloys.

♦ ♦ ♦

According to a recent patent local hardening may be accomplished easily if the steel contains from 0.2 to 0.5 per cent molybdenum. The piece is immersed in water up to desired hardening depth and heated with a gas torch to 1250 to 1700 degrees Fahr. Length of time heat is applied determines depth of hardening. Then the piece is quenched in water. Hardness of 90 to 100 scleroscope is claimed with a thin sharp line of demarcation between hardened and unhardened portions.

♦ ♦ ♦

A recently developed small open-hearth furnace of 1000 pounds capacity uses crankcase draining for fuel.

♦ ♦ ♦

In addition to the various instruments and devices now in use for testing, controlling and determining the various properties of molding and core sands, a new instrument now is available for indicating the flowability, that is the ease or difficulty with which any given sand mixture will move when it is rammed, squeezed or jolted. The reading scale may be attached to the regular A. F. A. compression test machine and the relative flowability of the sand is indicated by the reduction in volume effected in the sand specimen by an extra impact from the falling weight.

♦ ♦ ♦

INSTEAD of using a spindle and sweep to spread a new coating of loam on a mold used repeatedly for a cylindrical casting, one foundryman lowers a smoothly finished iron pattern into place and then spills loam into the space between the pattern and the brick wall of the mold. After the loam has set sufficiently the pattern is removed and the face of the mold is blacked and dried in the usual manner.

♦ ♦ ♦

A recently developed chromium cast iron contains from 20 to 30 per cent chromium, and is used for resistance to heat and corrosion. When present in that amount, chromium imparts a protective coating which is resistant to vapors containing sulphur and weak acids.

♦ ♦ ♦

The precipitation-hardening capacity and the mechanical properties of nickel-copper alloys containing aluminum may be enhanced further by additions of substantial amounts of iron, up to 20 per cent, according to recent commercial and experimental tests.

♦ ♦ ♦

A recent test applied to sand-cast aluminum alloys indicated that the transverse test does not yield any information concerning ductility which is not obtained equally readily from an accurately controlled tensile test. The investigator considered that the tensile test is preferable to the bend-test.

♦ ♦ ♦

Aluminum bronzes cast in a French automobile plant have the following analysis: Copper 88 per cent; aluminum 9 per cent; nickel 2 per cent; iron 1 per cent.

Five Minutes, Two Dollars

SHORT Range items represent entirely new ideas in the field of castings, in materials, supplies equipment, interesting twists in foundry practice, or suggestions on merchandising. Anything which in the opinion of the editors, is new and useful is entitled to first announcement on this page.

Readers have contributed to make this feature interesting and valuable, through tips and leads. To compensate those who supply material suitable for The Short Range, THE FOUNDRY will pay two dollars for each short item accepted and published. Five minutes time will suffice to write and mail a paragraph suitable for use. The only requirements are, is it a fact and is it new? Two dollars for five minutes is liberal compensation.

The FOUNDRY Family Photograph Album

Upper Left

C. E. WESTOVER
Burnside
Steel Foundry Co.
Chicago

Upper Right

MELVIN PATTISON
Industrial
Brownhoist Corp.
Bay City, Mich.

Lower Left

H. VON SCHRENK
American Society
for
Testing Materials

Lower Right

J. C. CHAMPION
Ohio Cultivator Co.
Bellevue, O.

Men of Industry

Whose Activities Are Making Foundry History

ARTHUR E. MURTON recently was placed in charge of manufacture of rolls at the Lima and Springfield plants by the Ohio Steel Foundry Co. Mr. Murton was graduated at the University of Illinois in 1925 and then became connected with the roll foundry of the Hubbard division, Continental Roll & Steel Foundry Co., East Chicago, Ind. He resigned his position as superintendent of that foundry to assume his new duties.

P. R. CLIPP has been made purchasing agent of the Roberts & Mander Stove Co., Philadelphia, succeeding the late W. E. Stephens. The company operates a foundry at Hatboro, Pa.

CAPT. H. B. LEBKICHER has been appointed administration member of the manganese industry code authority. Capt. Lebkicher is connected with the office of the assistant secretary of war.

GEORGE BATTY, technical director, Steel Castings Development bureau, Philadelphia, since its inception in 1928, has resigned and now is associated with the Crucible Steel Casting Co., Lansdowne, Pa., as technical director in charge of production and metallurgical development.

JOHN VACHA on Dec. 3, began his fifty-first year in the shipping department of the National Malleable & Steel Castings Co., Cleveland. Mr. Vacha will celebrate his golden wedding anniversary in April of next year, and at that time will have lived in his house at 2953 East Fiftieth street for half a century.

THOMAS W. PANGBORN, president, Pangborn Corp., Hagerstown, Md., was re-elected president of the National Founders association. Born in Brooklyn, N. Y., in 1880 he spent his early childhood in Minnesota and returned to New York at the age of 17, when he received his first experience in foundry activity. In 1900 he became a salesman for Hendricks Bros., New York, dealers in metal and continued with that organization until 1904 when he founded the Pangborn Corp. at Hagerstown.

Mr. Pangborn has served as a director of the American Foundrymen's association, is a director and past president of the Foundry Equipment Manufacturers association, a member of the American Society of Mechanical Engineers, and during the war was county director of the Maryland State fuel Administration and later of the Maryland reconstruction advisory board.

Thomas W. Pangborn

M. L. BETTCHER, formerly general superintendent, has been made general manager of the Duriron Co. Inc., Dayton, O., succeeding DUDLEY H. MILLER who recently was made executive vice president. Mr. Bettcher was graduated from New York university with a degree in mechanical engineering, and then served overseas as an officer in the 309th engineers. In 1920, shortly after being discharged from the army, he joined the Duriron organization as a salesman in the Chicago district, and later was transferred to the manufacturing department at the plant and general offices in Dayton.

N. E. PHILPOT, formerly manager of the Chicago office, Duriron Co. Inc., Dayton, has been placed in charge of the New York office, succeeding W. E. PRATT, recently resigned. COL. M. W. SMITH, formerly manager at Buffalo has been placed in charge of the Chicago office. W. A. WATKINS has been transferred from the general sales department at Dayton to Buffalo as manager of that office.

E. P. POLUSHKIN, former instructor in metallography at the School of Mines, and lecturer on dental metallurgy at the School of Dentistry, Columbia university, has joined the staff of Lucius Pitkin, Inc., New York, as associate metallurgist with particular reference to research and development.

A. P. MARWICK has been appointed sales manager, Burnside Steel Foundry Co., Chicago. Mr. Marwick is a native of Chicago and started working for the Pettibone-Mulliken Co., Chicago in 1906 as a clerk in the railway track supply business. In 1922 that company built a manganese steel foundry and he became a salesman of commercial manganese steel castings. In 1924 he was made assistant manager of manganese sales; in 1927, manager of manganese sales where he remained until the latter part of 1929 when he resigned to become associated with the Taylor-Wharton Iron & Steel Co., High Bridge, N. J., in their sales department, with headquarters in Chicago.

DR. W. H. HATFIELD, director of research at the Brown-Firth Research laboratories, director of Thomas Firth & John Brown Ltd. and a member of the council of the British Iron & Steel institute since 1927, has been elected a vice president of the institute. DR. Hatfield was the author of the British exchange paper presented at the recent Philadelphia convention of the American Foundrymen's association.

SIR WILLIAM J. LARKE, director of

the British Iron & Steel federation and honorary member of the council since 1927 also has been elected a vice president of the institute.

LIEUT. COL. SIR MAURICE H. L. BELL, director of Dorman, Long & Co. Ltd., and likewise a member of the council since 1927 has been elected an honorary vice president of the iron and steel institute.

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FRED J. WALLS, formerly metallurgist, Eaton-Erb Foundry Co., Detroit, has accepted a position as development and research engineer specializing in nickel and cast iron with the

Fred J. Walls

International Nickel Co., Inc., New York.

Mr. Walls is a native of Oakland County, Mich. and attended the University of Michigan, Ann Arbor, specializing in metallurgy. He then was connected with the Packard Motor Car Co., Detroit and the Consolidated Mfg. Co., Toledo, O. In 1915 he became associated with the Wilson Foundry & Machine Co., Pontiac, Mich., and in 1923 was made metallurgist of that company.

Mr. Walls has been active in association work and in 1930 was author of the annual exchange paper presented before the Institute of British Foundrymen. He is past president of the Detroit Foundrymen's association and is a member of several technical committees of the American Foundrymen's association. He is also a member of the American Society For Testing Materials and the American Society For Metals.

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DAVID M. CURRY has been appointed to the development and research staff of the International Nickel Co. Inc., New York, where he will be active in development work in the nonferrous casting field. Mr. Curry was associated with the Ford Motor Co. for 11 years as assistant superintendent of the foundry departments and later was in charge of all foundry activities of the Federal Mogul Corp., Detroit. In recent years he has maintained his own consulting practice.

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BEN F. PARLETT JR. has been appointed sales representative at Pittsburgh, for the National-Erie Co., Erie, Pa., succeeding MARK S. JAMES.

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J. R. TOWNSEND, general development laboratory, Bell Telephone Laboratories, Inc., New York, has been made chairman of committee B-6 on die cast metals and alloys of the American Society for Testing Materials. W. H. GRAVES, chief metallurgist, Packard Motor Car Co., Detroit, has been made vice chairman, and P. V. FARAGHER, metallurgist, Aluminum Co. of America, Pittsburgh, has been reelected secretary.

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CHESTER H. LEHMAN, formerly sales manager and secretary, Blaw-Knox Co., Pittsburgh, has been appointed vice president in charge of sales.

H. B. LOXTERMAN, active with the Blaw-Knox Co. since its organization in 1906 succeeds Mr. Lehman as secretary and becomes a director in place of HOWARD SACHS who has resigned.

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HERMANN VON SCHRENK (see FOUNDRY Album on page 30), consulting timber engineer, St. Louis, recently was elected president of the American Society for Testing Materials by the executive committee to fill the vacancy caused by the death of W. H. Bassett. Mr. Von Schrenk formerly was senior vice president of the society.

Mr. Von Schrenk was graduated from Cornell in 1893, Harvard in 1894, and Washington university in 1898, where he received his Doctor of Philosophy degree. He was instructor in plant diseases at Washington university from 1896 to 1903; pathologist in charge of Mississippi Valley laboratory, U. S. department of agriculture, from 1898 to 1907 and in charge of timber investigations, special agent and chief, Forest Products, bureau of forestry, U. S. department of agriculture, from 1901 to 1905. He is consulting timber engineer for a number of railroads and is the author of several books dealing with timber problems.

H. S. VASSAR, Public Service Electric & Gas Co., Irvington, N. J. was made senior vice president and A. C. FIELDNER, chief engineer, Experiment Stations division, U. S. bureau of mines, Washington, was elected junior vice president.

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ALEXANDER BLACKWOOD, formerly general manager, Chicago Steel Foundry Co., Chicago, has been appointed general manager, Dayton Steel Foundry Co., Dayton, O., and will have charge of manufacture, heat treatment and marketing of alloy steel castings, stainless steels and heat resisting alloy steels.

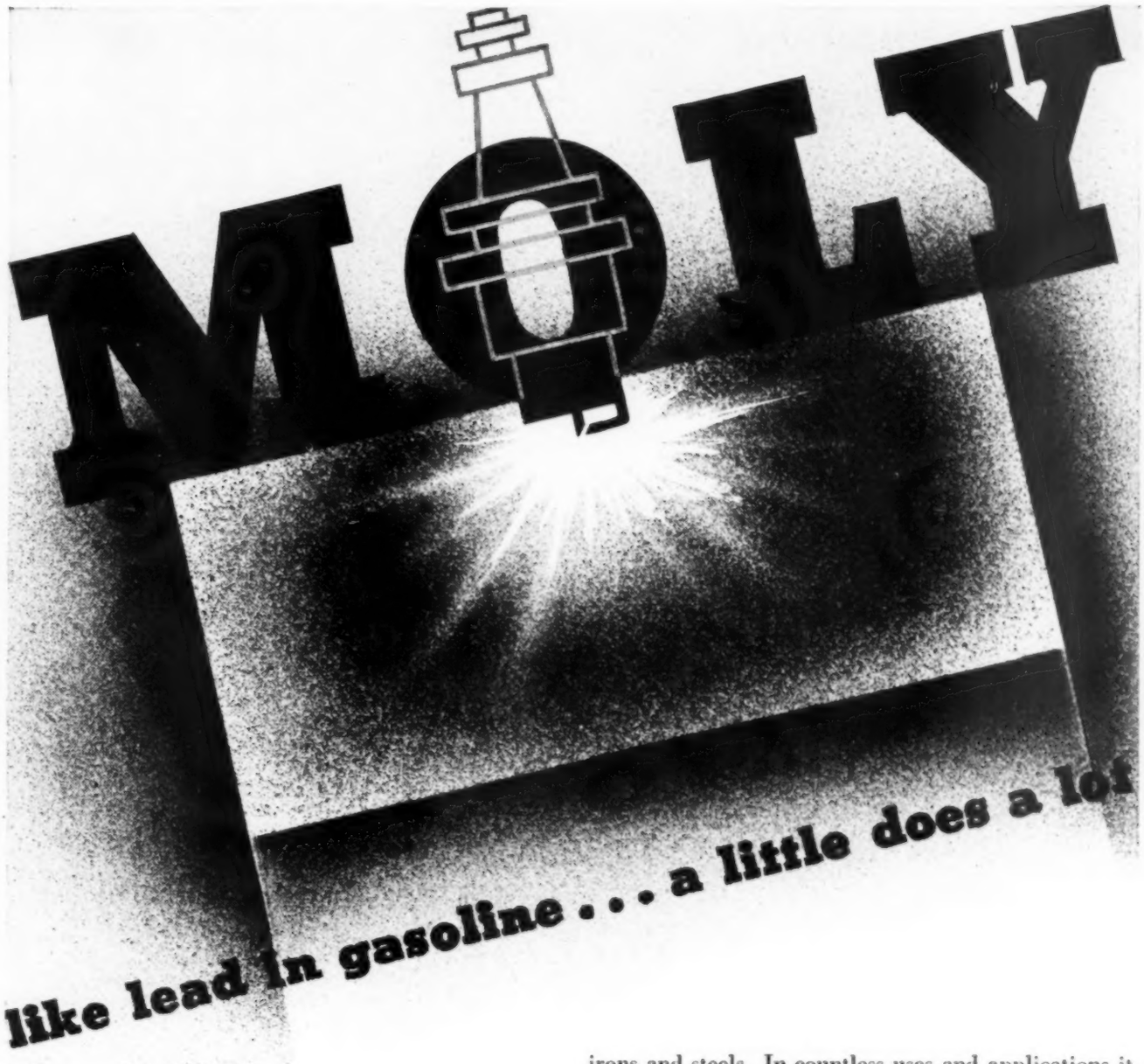
Mr. Blackwood received his technical education in Scotland and Germany. He then was employed as general manager of the Acme Steel Co., Glasgow, Scotland. In 1907 he came to this country and was appointed consulting metallurgist and manager of the Sauntry Process Co., New York. Since 1908 Mr. Blackwood has been connected with several steel foundries specializ-

Alexander Blackwood

ing in the manufacture of heat treated alloy steel castings. For 8 years he was vice president of the Michigan Steel Casting Co., Detroit, for 3 years general manager of the Farrell-Cheek Foundry Co., Saudusky, O., and for 3 years, general manager of the Chicago Steel Foundry Co.

To Handle Complaints

National Recovery Administration recently announced approval of the trade practice complaints committees of the toy and playthings industry as follows: W. C. Lehman, chairman, Lehman Co. of America, Cannelton, Ind.; W. O. Coleman, American Flyer Mfg. Co., Chicago; W. A. Coventry, Grey Iron Casting Co., Mount Joy, Pa.; T. S. Dowst, Dowst Mfg. Co., Chicago; B. L. Flieschaker, Fleischaker & Baum, New York; A. C. Gilbert, A. C. Gilbert Co., New Haven, Conn.; F. J. Hannon, Murray-Ohio Mfg. Co., Cleveland.; B. H. Hayes, F. A. Whitney Carriage Co., Leominister, Mass.; and Harrie C. White, H. C. White Co., North Bennington, Vt.



WHAT is probably the most remarkable of "Moly's" many qualities toward improving iron and steel becomes strikingly apparent in its use in copper-bearing ingot iron. *Less than one-tenth of one per cent* is known to allow the addition of twice as much effective copper in ferrous metals designed to resist atmospheric corrosion and that encountered in mildly acid or oil-refinery liquors.

In fact, service data show copper-Molybdenum ingot iron considerably more resistant to atmospheric corrosion than copper-bearing steels. And one oil refinery claims that in contact with corrosive oils at elevated temperatures this material has outlasted plain carbon steel by *more than three times.*

The outstanding development of modern metallurgy is unquestionably the growth in use of Molybdenum irons and steels. In countless uses and applications it has been definitely proved that Molybdenum increases resistance to corrosion, fatigue, shock, creep, abrasion and temper embrittlement in plain or otherwise alloyed irons and steels. Making heat-treated steels easier to machine and weld—without loss of strength—is another of its characteristics. And its ultimate possibilities have not yet been approached.

"*The Moly Matrix*" is our new house organ, planned to help executives and engineers keep informed of Molybdenum's progress. A simple request puts you on our mailing list. A further request brings you either or both of these new books: "*Molybdenum in* 1934" and "*Molybdenum in Cast Iron*—1934 *Supplement.*" And our metallurgists and experimental laboratory in Detroit offer ready assistance toward solving any alloy problems you may have. Climax Molybdenum Company, 500 Fifth Avenue, New York City.

In Canada—Railway & Power Engineering Corporation, Ltd., Montreal

CLIMAX Mo-lyb-den-um

Reader's Comment

Interesting communications from readers of The Foundry

EDITOR'S NOTE — *Material Appearing Under this Head Does Not Necessarily Reflect the Opinion of* THE FOUNDRY *or of Its Editors.*

Would Penalize More Progressive Firms

TO THE EDITORS:

I cannot agree with the editorial on page 17 of THE FOUNDRY for November, relating to the governmental recommendations relative to costs. Some of the items specifically eliminated from consideration in arriving at costs, quite properly should be cut out. For example, if it were mandatory to include charges for research, promotion and advertising, the most progressive firms in business today would be at a definite disadvantage.

Consider the case of competing foundries, one of which devotes a considerable sum to research and promotion leading to the wider use of its product and the development of new products and uses. Such a firm, if obliged to include a distribution of these items in the cost of every job, never could compete. Prices including such items always would be higher, or if they were not included, the danger of complaint and code penalty for selling below cost would constantly confront such a foundry. Naturally, the foundry not having any advertising or development expenditures could honestly quote lower prices and still be above its costs.

FOUNDRY MANAGER

Price Level Raised

TO THE EDITORS:

On page 17 of the November issue of THE FOUNDRY, there is an article entitled "Gifts of the Greeks." As I understand this article, it refers to the publication gotten out some time ago by the planning and research division of the NRA in which they outlined the various items of cost that should or should not by compulsion, be included in the cost of any article. This NRA publication, as you state, does stipulate that certain items need not necessarily be included in cost especially during depression time.

The gray iron foundry industry, in preparing the uniform cost and estimating system, admitted many or all of these principles. However, the point that I have in mind is that in spite of the omission in our cost system of some elements of cost, the uniform cost and estimating system has proven —and is daily proving — to be of material benefit to the industry.

Prices of various castings have had to be substantially increased from the price levels prevailing before the approval of the cost system in order to make them conform with the requirements of the system. In other words, although the uniform cost and estimating system does not require the inclusion of all elements of cost, it requires the inclusion of a sufficient number of these items so that foundries have been forced to increase their prices, and as a result the level of prices in the industry raised.

H. M. HALSTED JR.

Executive Vice President
Gray Iron Founders' Society Inc.

Not High Test Iron

TO THE EDITORS:

A recent issue of a technical paper presented a photograph and description of a broken forging head casting, also how this casting was repaired by welding at a cost of $200 as compared with an estimated cost of $1000 for a new 6000-pound casting. Several features in this article seem to challenge attention. In the first place, basing an opinion on the photograph and comparing the casting with others with which I am familiar, I should say that the casting weighs 3000 instead of 6000 pounds. Possibly a typographical error, or a mistake on the part of the writer in setting down 3 tons instead of 3000 pounds. Naturally this would mean a substantial reduction in the cost of the casting.

However, assuming that I am mistaken and that the casting actually weighed 6000 pounds, I'll make all these castings I can get for $500, machined and fitted to the old caps. Also the customers will get good castings. Estimated cost is distributed as follows: Pattern, $100; casting, $240; machining, $150, or a total of $490.

The writer of the article states that the casting was high grade cast iron. As a plain matter of fact the reason it broke is because it was not high grade cast iron. This is apparent to any experienced foundryman who cares to examine the fracture as shown in the lower picture on the left. I know just what it would look like under the microscope as I have seen similar fractures in other castings which have failed in service.

A. C. DENISON.

President, Fulton Foundry & Machine Co. Inc., Cleveland.

A. S. T. M. To Hold 1935 Meeting in Detroit

The 1935 annual meeting of the American Society for Testing Materials will be held in the Book-Cadillac hotel, Detroit, June 24-28. In addition to the technical program, the association plans to hold the third exhibit of testing apparatus and related equipment during the week of the annual meeting.

A symposium on paint will feature the 1935 regional meeting of the society to be held in Philadelphia, March 6.

Book Review

Die Castings, by Herbert Chase, cloth, 264 pages, published by John Wiley & Sons, Inc., New York and supplied by THE FOUNDRY, Cleveland for $3.50 plus 15 cents postage and in Europe by the Penton Publishing Co., Ltd., London.

Many problems of the die casting industry are discussed in this book which deals primarily with the product, its composition, uses and design, rather than with methods followed in production, although some of the latter are outlined briefly. The author has presented material from which the reader can form a better mental picture of the commercial and technical possibilities of die castings; set forth the characteristics of various alloys suitable for die casting; compiled information needed for the intelligent design of die castings, presented facts useful in the specification, inspection and tests of die castings; and furnished an outline of types of finishes available for die castings.

The text has been written with the aim of supplying engineers, products designers, executives, students, and others engaged or interested in the metal working arts with the latest information on the subject. The aim has been to explain how die castings can be applied advantageously as component parts of various products and what alloys are best used in the construction. An exceptionally large number of illustrations show to advantage a wide variety of die cast parts.

Made Special Engineer

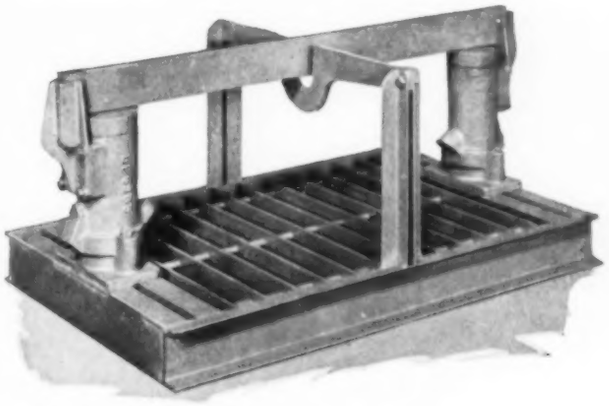
Alphonse F. Brosky, formerly consulting editor, *Coal Age*, and during the past winter assistant fuel advisor to the Federal Surplus Relief Corp., Washington, has been appointed special engineer of the Jeffrey Mfg. Co., Columbus, O.

The SHAKE-OUT

The Beardsley & Piper Shake-Out has been proven by years of service under most severe conditions and is approved by foundrymen in every class of foundry, both jobbing and production, because it eliminates all of the troubles common to other types of shake-out equipment.

It has no parts to break — and wear is minimized. Air requirement is unusually low. Has only two moving parts. Low in first cost and operating cost. *Unconditionally Guaranteed for one year.*

Install a Beardsley & Piper Shake-Out—eliminate lost time, trouble and breakdown costs! Note Beardsley & Piper Shake-Outs are unconditionally guaranteed!



A fully illustrated descriptive folder is yours for the asking.

THE BEARDSLEY & PIPER COMPANY
2541 N. Keeler Ave., Chicago, Ill.

New - Better - Different -

The new "Gyratory" Screen, ruggedly designed for heavy duty foundry service, fills the wants of every foundryman. It has greater capacity per square foot of screen area. It requires a minimum of head room, length and width. It imparts *no* vibration to the adjacent structure because it is perfectly balanced. Operating mechanism is dust sealed. Screens are easily and quickly changed. Lubrication is simple. No parts to break or quickly wear. Requires one horsepower motor or less.

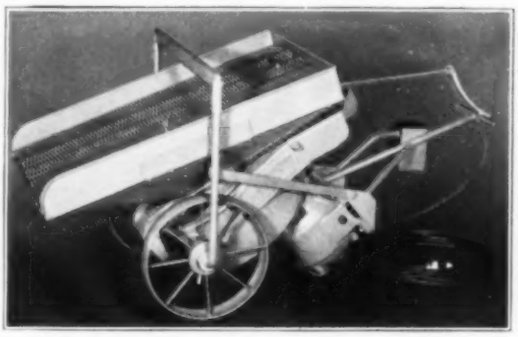
Gyratory Screens are made in types and capacities to suit every application and provide capacities unheard of in other types of screens.

Send for illustrated bulletin on this new, faster and more economical screening device.

THE
BEARDSLEY & PIPER
COMPANY
2541 N. Keeler Ave., Chicago, Ill.

PORTABLE SAND PREPARATION

It Screens!
It Double Aerates!
It Piles!



The operation is simple. Sand is shoveled onto the corrugated screen on the top of the Screenarator (just 14" off the floor) where the lumps are broken and the refuse screened out. Sand falling through the screen is aerated and drops into the rotor from which it is expelled (and again aerated) in a pile or fluffy windrow. Gaggers, cores and other sand contamination are entirely eliminated from the heap.

The Screenarator is the ideal portable sand conditioner. Write for descriptive folder.

The Screenarator, an improved, portable sand screening, aerating and piling device, is the ideal sand conditioner for the big or little foundry.

The Screenarator is a low cost, fully portable sand screening, blending, aerating and piling unit for preparing heap and facing sand.

THE
BEARDSLEY & PIPER
COMPANY
2541 N. Keeler Ave., Chicago, Ill.

FOUNDRY IMPROVEMENTS

Many foundrymen have improved their shop conditions and the profit side of their ledgers as well, by installing one or more of the many new cost reducing foundry equipments that have been perfected during the "lean years." A new machine for screening, sand preparation, shake-out or other work has proved a profitable investment in many shops throughout the country, eliminating obsolete, costly operations. Some equipment makers offer the foundryman an opportunity to test equipment in their own shops under their own operating conditions, so that they can be sure of results before a definite commitment is made. This practice of "test before you buy" has worked out for the benefit of both manufacturer and foundry operator in many cases.

Where conditions justify, the Beardsley & Piper Company will give you an opportunity to test out their equipments in your own plant.

We suggest that you "improve your mechanical equipment today to improve the black side of your ledger tomorrow."

Convention Shows Industry Gaining

(*Concluded from November issue*)

MANY foundries, both large and small, are realizing that careful specifications for core and molding sand are essential to efficient castings production, in the opinion of A. V. Leun, Bethlehem Steel Co., Bethlehem, Pa., speaking at the opening of the shop course on sand control, at the Philadelphia convention of the A.F.A.

Factors involved in specifying sand include dry strength, green strength, screen analysis, permeability and fineness. Once specifications for these qualities are set, suppliers of sand are held within certain limits and will make every effort to meet them. Similarly, tests can be made advantageously for core binders.

Answering the question as to how large a foundry must be before sand control methods can be used profitably, L. B. Knight Jr., National Engineering Co., Chicago, stated that, to a certain extent, every foundry can benefit from sand control. In the smaller unit, where the necessary equipment is not available for testing the sand, resort can be made to cut and try or empirical methods such as watching the castings closely and attempting to relate quality of castings to quality of sand used in their production.

Control Reduces Costs

Prof. H. Ries, Cornell university, Ithaca, N. Y., commented upon the recently developed Attleberg test for a quick determination of cohesive quality of clays.

Discussion from the floor seemed to emphasize the point that sand conditioning and control generally results in better castings at lower cost. Furthermore, its adoption often means improved labor relations, since with a careful check on sand, molders and others who handle the sand have no excuses for blaming defective castings upon the sand. Speakers from several plants pointed briefly to how sand control methods had aided their production problems measurably.

Continuing the shop course on sand control problems Tuesday morning, with Dr. Ries in the chair, H. W. Dietert, H. W. Dietert Co., Detroit, opened the discussion on classification of foundry sands.

In specifying core sand, Mr. Dietert suggested the A. F. A. fineness number as giving good control. For molding sand two factors, namely strength and permeability, are desirable. Tolerances should be set according to the ability of the producer, that is, according to whether or not the producer is able, financially or otherwise, to supply a sand coming within the specified tolerances. In other words, tolerances must not be set too rigidly without regard to the source of supply.

Shear strength tolerances may vary 2 points, while permeability tolerances may be specified in the neighborhood of plus or minus 3 points. These limits apply to a sand which is not of the highly bonded type and in which shear strength ranges about 1.7 pounds and permeability about 30.

Benjamin D. Fuller, Whitehead Bros., New York, recommended that foundrymen work with sand producers on a good-will basis, and visioned specifications as highly desirable if they are set up and observed with proper co-operation between foundry and sand producer. Support for the A. F. A. specifications for sand was voiced by H. B. Hanley, American Laundry Machinery Co., Rochester, N. Y., who further stated that it was surprising to him how few foundrymen really know what they want in a sand.

Mr. Dietert stressed the importance of specifying certain factors in core sand. Casting loss and finish of casting are affected decidedly by the qualities of the core sand used. In reply to a question, he listed typical tolerances on sand specifications. On a core sand, with average fineness according to A. F. A. number about 55, tolerances of plus 2 and minus 3 were suggested. On a molding sand of the Olean type, with permeability of 30 and shear strength of 1.7 pounds, tolerances of plus or minus 3 for the former and minus 0.2 pound on the latter were recommended. No upper limit was set on shear strength, since this will not run over about 1.9 if the permeability is to remain at about 30. Fines, including pan, 270 and 200 mesh, should be held less than 25 per cent.

R. F. Harrington, Hunt-Spiller Mfg. Co., Boston, also recommended working closely with the sand producer, and suggested setting up only rough specifications and asking for sand samples. He advocated a reasonable attitude in rejecting sand shipments, pointing to the example of setting 18 per cent as the lower limit on clay in gravel and accepting shipments on material which ran as low as 17.5 per cent, although in the latter case there probably would be just grounds for strenuous complaint to the sand producer.

Causes and remedies of defects in foundry sands were discussed at the third session of the sand control shop course on Wednesday. Chairman was R. F. Harrington, Hunt-Spiller Mfg. Corp., Boston, and the discussion was led by J. A. Sweeney, Florence Pipe Foundry & Machine Co., Florence, N. J., who outlined specifications for sand in a shop casting centrifugal pipe.

Sand for Pipe Molds

A synthetic sand shows the following screening qualities: On 6 mesh, none; on 12 mesh, 10 per cent maximum and through 40 mesh, 10 per cent. In using the sand it is necessary to introduce the proper amount of new sand into the mixture regularly. A chemical analysis is made at least every 3 months, mainly as a check on the supply source.

Pipe produced in this shop ranges up to 48 inches diameter and up to 4000 pounds in weight. Metal is cast centrifugally at speeds ranging from 400 to 1400 revolutions per minute and at temperatures from 2500 to 2700 degrees Fahr. Cast sections may be as light as ¼-inch and 16 feet in length, up to 2 inches in thickness and 20 feet in length.

Bonding material is a clay wash. In the molding practice it is essential that foreign matter be excluded from the sand to prevent mold scabs. To guard against this foreign matter, the sand passes through a heavy reciprocating screen just before it is admitted to the mold.

Mr. Sweeney emphasized the need for proper venting of the flasks, saying that sand often is erroneously blamed for a flask condition which is the result of poor venting. Mr.

(*Concluded on page* 39)

A. F. A. Convention

ENTHUSIASM of an industry pulling on the upward grade permeated every activity at the recent convention and exposition of the American Foundrymen's association in Philadelphia. So great was the interest in the many ramifications of the technical program and exposition features that available space would not permit a complete and detailed report of all important events in the November, Post-Convention issue of The Foundry. Therefore reports of the sand control and the gray iron practice shop courses, and sessions on patternmaking and refractories, are concluded on the following pages. Also, additional pictures of the interesting exhibition of equipment and supplies are presented.

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THE TIDE *HAS* TURNED

POSITIVE gains prove beyond dispute that intelligent planning has superseded policies of retrenchment that held close leash on business for the past four years. The success of the American Foundrymen's association convention, as to attendance, interest and active buying, indicate that the foundry industry is on the move toward better times. The front cover of this issue presents a few of the many statements sounding the note of assurance, of reawakened initiative and of determination to push through to better times in 1935.

In every shop throughout the industry, obsolete equipment demands replacement. Economy in production, new materials, machines and methods must be provided. Foundries will buy from manufacturers that can satisfy these demands and have established confidence and faith in themselves and their products through modern merchandising and sustained advertising.

(*Concluded from page* 36)

Harrington emphasized the importance of vents.

H. W. Dietert, Detroit, pointed out that a more permeable sand prevents the formation of scabs. He also referred to other factors in molding practice, among them the clay content of the sand which affect scab formation.

Mr. Sweeney elaborated upon further essentials in pipe molds. The mold must be concentric with the flask within 1/32-inch and the mold must not be too hard.

Replying to a question on causes and remedies for rat-tails on stove plate work, Mr. Dietert emphasized the importance of correct gating. He also suggested that mold hardness be reduced to about 40, and that sea coal or other material be added to the sand.

Metal Penetrates Cores

The fourth session of the shop course on sand control, with A. C. Jones, Lebanon Steel Foundry, Lebanon, Pa., in the chair covered sands and binders in steel foundry practice. J. N. Ludwig, Electro Metallurgical Co., New York, discussed various phases of the subject, including metal penetration of core sand. The core has two functions in the casting operation, one to provide resistance to the hot metal in motion. The molten metal rushing into the mold exerts a certain abrasive action on the core and in this case penetration is mechanical. The other function of the core is to offer resistance to the hot metal when it has come to rest, and penetration takes the form of thermal action.

In small castings, penetration of core is mainly mechanical, while in large castings it is chiefly of the thermal type. Factors affecting penetration include fluidity of the metal and whether acid or basic practice is being carried out.

Mr. Ludwig claimed that thermal penetration is caused by a combination of chemical and physical actions and suggested two elimination methods. First, he advocated eliminating the fluxing action of iron oxide in the core face, this to be accomplished by changing the facing material. Second he suggested a reduction in the hydrostatic pressure of the metal on the core by providing a greater resistance at the core face or "closing up the core face."

H. M. Lane, Detroit, cited an instance of complete penetration of a ¾-inch core in a foundry casting a certain phosphor bronze part. Use of finer sand overcame the difficulty.

Dr. H. Ries asked what the maximum limit on sodium and potassium in core sands was considered to be. No one could offer a very complete answer, although one speaker observed that in a certain sand with which he had had experience the upper limit on sodium nitrate content was set at about 1 per cent.

Several features in connection with sand control and research occupied the attention of those who attended the Friday morning session under the chairmanship of W. G. Reichert, Singer Mfg. Co., Elizabethport, N. J. R. E. Aptekar presented a paper "Sea-Coal Analysis as Applied to Black Sand," in which he described a method for analysis which permits study of the composition and a quantitative determination of available combustible matter in sand. The method depends on the analysis of each shipment of sea coal to determine the grain fineness, total carbon, volatile combustible matter and fixed carbon. The clay content of the sand exerts an important influence on the accuracy of the methods involved. He described the action of sea coal and demonstrated his methods of calculation to support his contentions. A constitution diagram explains the action of sea coal in foundry sands.

Flowability of molding sand was described in a paper by H. W. Dietert and F. Valtier, Harry W. Dietert Co., Detroit. According to this paper flowability is the property which enables sand to flow when ramming energy is applied. The greater the ease of flowing, the more readily will the sand form a continuous and uniform mold surface. A test for flowability consists in measuring the movement of sand grains after an initial ramming. The relation of flowability to the other properties of sand may be summarized as follows: It is increased by a decrease in moisture, in clay content, in green sand strength, green permeability, or an increase in grain fineness toward the finer grain materials. Flowability is decreased by the addition of sea coal.

Studies Sand Grains

In a paper "A Comparison of Some Methods Used for the Fineness Tests of Sands and Clays" R. C. Hills, Cornell university, Ithaca, N. Y., the author presented the results of an investigation of the better known wet methods for determining the fine sized particles of clays, molding sands, soils, and other fine grain natural and artificial substances. In molding sand grain size is the most important single property. All other properties, permeability, strength, etc., are influenced to a great extent by the grain size. The comparative study was made in an attempt to determine how closely the several methods checked and how they compared in simplicity of operation. The author also showed the effects of different electrolytes and the temperature and character of the water used.

Refractories in the Foundry

EQUILIBRIUM studies in cupola operation made by A. H. Dierker, experiment station, Ohio State university, Columbus, O., comprised the initial report of the technical session on refractories. According to the speaker, information on cupola refractories is somewhat meager, but these refractories behave in a general way the same as refractories in other types of melting units. A study of equilibrium diagrams—both the binary diagram of iron oxide and silica and the ternary diagram of iron oxide, silica and lime, reveals much information about slags in which these three components are present.

Mr. Dierker reported that slags of the lowest melting point are not always of the best working type, since the the matter of viscosity also must be considered. Magnesia in a slag has the tendency to lower viscosity.

Results were cited of the experience of one foundry in adding dolomite to a cupola, providing a more fluid and easy working slag. In open-hearth furnaces the opposite effect is produced by that practice, since in the latter case the slag is produced under highly oxidizing conditions while conditions in the cupola are of the reducing nature. In selecting a cupola refractory, maintenance of the lining for the longest period is the desired end.

H. M. Lane, Detroit, described a procedure carried out by a foundry in France where a syphon-breast cupola was operated and it was desired

to reduce the sulphur content of the iron. A synthetic slag was formed by adding both silica and lime to the cupola, giving a thick layer of slag over the metal.

Some notes on refractories for electric furnaces producing special irons, prepared by L. C. Hewitt, director of research, Laclede-Christy Clay Products Co., St. Louis, were presented by J. R. Kaiser of that company. Developments in refractories and their application to the direct and indirect arc furnaces were reviewed. The refractory problem was seen as more serious for the indirect arc furnace and, with the possible exception of the direct arc roof, different types of refractories are required.

Introduction of a comparatively new type of refractory brick has aided greatly in reducing refractory costs for the indirect arc furnaces. This refractory is noted particularly for its combination of low porosity and high thermal shock resistance, together with high refractoriness and volume stability at high temperatures. Careful lining installation with minimum joints, use of proper bonding cement, precautions during preliminary heating, close control over superheating temperatures and the use of some special compounds as a metal cleanser and lining conditioner, were among the service factors cited as bearing upon refractory performance.

Special Brick Reduces Cost

Use of that type of brick on indirect arc furnaces was favored by Garnet P. Phillips, metallurgist, Frank Foundries Corp., Moline, Ill., who pointed out his experience with that brick, noting that lining troubles were eliminated and maintenance costs reduced 20 per cent.

Properties of fireclays from different sources were summarized by J. B. Blewett, McLain Fire Brick Co., Wellsville, O. He introduced his subject by pointing out that clays are chosen on a basis of delivered cost and their suitability for a given service. Different clays from a single district, considered similar, may vary in such properties as fineness in grinding, physical qualities, firing behavior and chemical analysis.

Fireclays for satisfactory service must show good binding power, plasticity, ability to hold impressed shape under heat, and ability to withstand temperature attacks, abrasion, fluxing, spalling or a combination of these.

The speaker reviewed the salient properties of various types of clays, notably those produced in Ohio, Pennsylvania, West Virginia, Kentucky, Maryland, Missouri and New Jersey.

Modern equipment used in crucible melting was discussed by Richard H. Stone, Vesuvius Crucible Co., Swissvale, Pa., in the concluding paper of the session. Crucible melting recently has received an impetus due to the adoption of fuels not generally used previously, to better refractories, greater crucible life and new furnace design. Fuel costs were compared and difficulties encountered with various fuels and how to overcome them were outlined.

Life of crucibles, on the average, has been more than doubled in the past 10 years. This has been due to the introduction of the self-glazing crucible which affords protection to the graphite against oxidation.

Study Melting of Gray Iron

GENERAL cupola practice featured the opening session of the gray iron shop course Monday under the chairmanship of P. T. Bancroft, John Deere Harvester Works, East Moline, Ill. The subject was outlined by W. H. Spencer, American Cast Iron Pipe Co., Birmingham, Ala., beginning with the preparation of the cupola for the day's heat and pointing out some of the factors incidental to carelessness or lack of knowledge which adversely may affect the result.

Most of the subsequent discussion hinged on the usual controversial features, size of charges, volume and pressure of blast, amount of limestone, size of coke, to soak or not soak the charge, high or low bed, weight or volume of coke, and slag.

Mr. Spencer referred to a misapprehension, gradually dying out to the effect that the cupola is a rather erratic type of melting medium and not to be compared to other melting equipment in which the operation may be controlled closely. He stated that in the hands of a competent operator, familiar with the subject and willing to take proper care of all the details, the cupola is as reliable as any other type of furnace.

Where the cupola is charged properly and lighted in a manner that permits the coke to burn through the bed, no advantage is gained by allowing the charge to soak for an hour or two before the blast is started. The only result is that a certain amount of the bed is burned away, and as a consequence that extra amount has to be provided for in advance. Satisfactory results are secured where the blast is applied immediately after the cupola is filled to the charging door.

Light and Heavy Charges

On the subject of light or heavy charges, Mr. Spencer claimed that local conditions constitute the deciding factor. Conceivably the iron charge might be so light that the corresponding amount of coke would not spread across the cupola. The same factor applies to the choice between large and small coke. There is a limit both above and below. For example large coke might prove a decided detriment in a small cupola but be quite satisfactory in a cupola of large diameter.

Several recited their experiences with lime in the cupola to reduce the sulphur content. In some instances coke was covered with whitewash, while in others whitewash was applied to the pig iron. Each speaker admitted that results were negligible. One speaker claimed that with a high blast the lime was driven through the top of the stack.

While most of those taking part in the discussion favored comparatively

(*Continued on page* 42)

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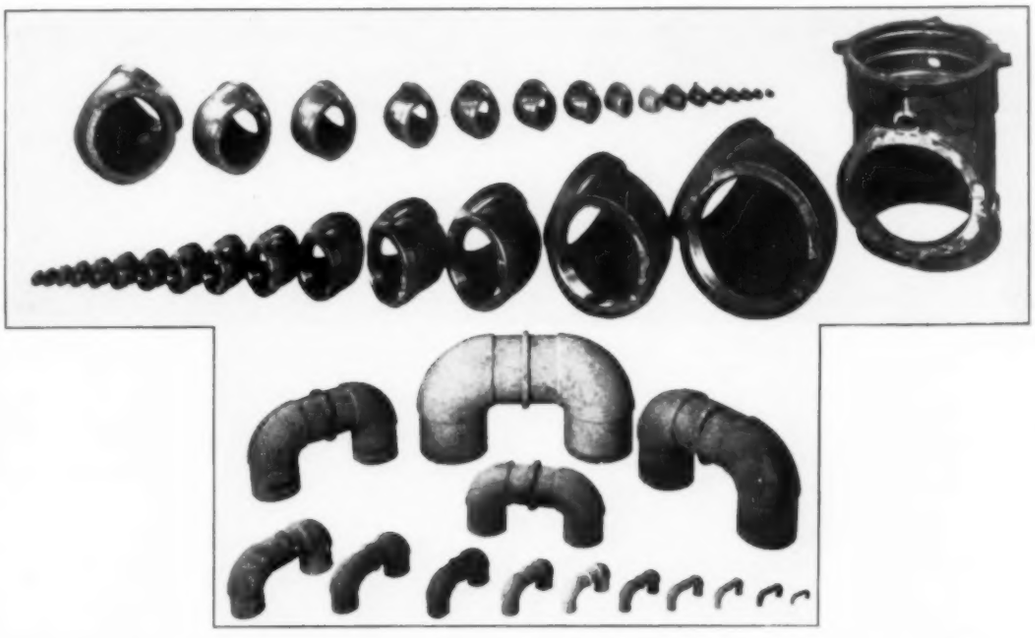

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(*Continued from page 40*)
low blast pressure compatible with sufficient volume to supply the required amount of oxygen. Fred J. Walls, Eaton-Erb Foundry Co., Vassar, Mich., claimed that better results were secured with pressures up to 35 ounces, and confidently looked forward to the time that foundrymen would regulate their charges to operate at a pressure of 5 pounds.

A comprehensive survey of the purpose, construction and application of the forehearth in connection with cupola operation was presented by George S. Evans, Mathieson Alkali Works, New York, at the iron shop course on Tuesday. With the aid of illustrations he described each type of forehearth, pointed out special advantages under different conditions and cited examples of efficient operation. He discussed certain objections raised from time to time by foundrymen who do not favor, or rather who do not see the necessity of employing a forehearth.

Mr. Evans also discussed methods of overcoming apparent difficulties encountered occasionally where the forehearth is in use. He emphasized the importance of selecting the right type of forehearth taking into consideration kind of castings produced, daily tonnage, composition of cupola charge, pouring facilities and other related features. In conclusion he outlined benefits resulting from intelligent use of the forehearth and went into considerable detail on several typical installations.

Discuss Use of Soda Ash

A considerable part of the ensuing discussion centered around the use of fused soda ash as a desulphurizing agent. Contrary to a somewhat general view the use of soda ash for that purpose is not new. Existing records indicate British foundrymen employed the material as far back as 1867, particularly in producing cast iron rolls where strength and other physical properties were required to a great extent. As with many other processes the knowledge was localized for many years. General information on the subject only has been disseminated in comparatively recent years in the foundry field.

In support of his contention that the combination of a forehearth and the use of soda ash is decidedly advantageous the author mentioned a prominent radiator foundry in which the cupola charge contains 97 per cent scrap metal. The castings meet every physical and chemical specification required.

The third gray iron shop course was held Wednesday with John Grennan, University of Michigan, Ann Arbor, Mich., as chairman. The subject of the session, small cupolas and their operation, was introduced by D. J. Reese, Whiting Corp., Harvey, Ill., who gave a brief resume of various factors to be observed. He pointed out that for best results it is advisable to use coke not smaller than 1 inch in the longest dimension nor larger than 3 inches, and that the iron also should be broken into small pieces whose diagonal dimension would not be greater than one-half the cupola diameter. With extremely small cupolas that was not always possible, and only could be approached.

Charge for Small Cupola

In answer to a question Mr. Reese said that with an 18-inch inside diameter cupola the coke charges should range from 50 to 60 pounds, and the iron weight should be varied until the hottest iron is obtained, rather than employing a definite iron charge and varying the coke. As for the expected duration of time of heat, it was brought out that 4 hours is about right although longer heats have been run. In lighting small cupolas, better results can be obtained by putting in the kindling wood, igniting it, and waiting until it was burning good. Then a small amount of coke is added and permitted to ignite. When burning a little more coke is added, and that practice is continued until all the bed coke is in place.

Natural draft was recommended in starting as more uniform results are secured. According to Mr. Reese, there is no reason for the temperature of iron melted in small cupolas being lower than that melted in large cupolas, if reasonably careful practice is employed. Some one inquired whether a forehearth would be of value with small cupolas, and Mr. Reese said that he believed that due to the small size required, heat losses, etc., the forehearth was not advisable. However, another member stated that he was using a forehearth in connection with a 24-inch inside diameter cupola and he would not be without it.

The forehearth was connected directly to the cupola by a closed passage 4 x 6 inches, and was the same diameter as the cupola. The forehearth was preheated to as high a temperature as possible by a wood fire. After the iron begun to enter the forehearth no further heating was necessary as cupola gases high in carbon monoxide were carried through the closed passage into the forehearth where they ignited and supplied heat. In answer to a question on the need for soaking, that is to allow the cupola to stand for some time after igniting before the blast was turned on, it was pointed that numerous tests indicate there is nothing to be gained by the practice. Also unless the bed is made considerably higher than actually necessary, soaking tends to lower the bed from its proper place.

Electric furnace melting was discussed at the concluding gray iron shop course Thursday afternoon under the direction of Fred J. Walls. The discussion was opened by R. W. McElwee, Ecorse Foundry Co., Ecorse, Mich., who pointed out that the electric furnace is not a cure-all for foundry troubles, and that selection of a suitable electric melting unit needs careful consideration.

Factors in Electric Milling

Factors to be considered are materials available for melting, cost of power, type of shop, that is jobbing or production, etc. The speaker said his company operated a jobbing foundry, and that the electric furnace was found advantageous for melting as it possessed considerable flexibility. For the successful application of the electric furnace, close attention must be paid to the details of melting.

John Grennan, University of Michigan, Ann Arbor, Mich., asked for information on the control of carbon

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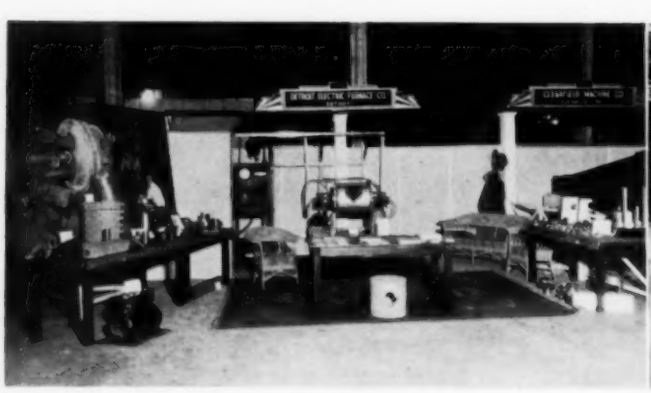

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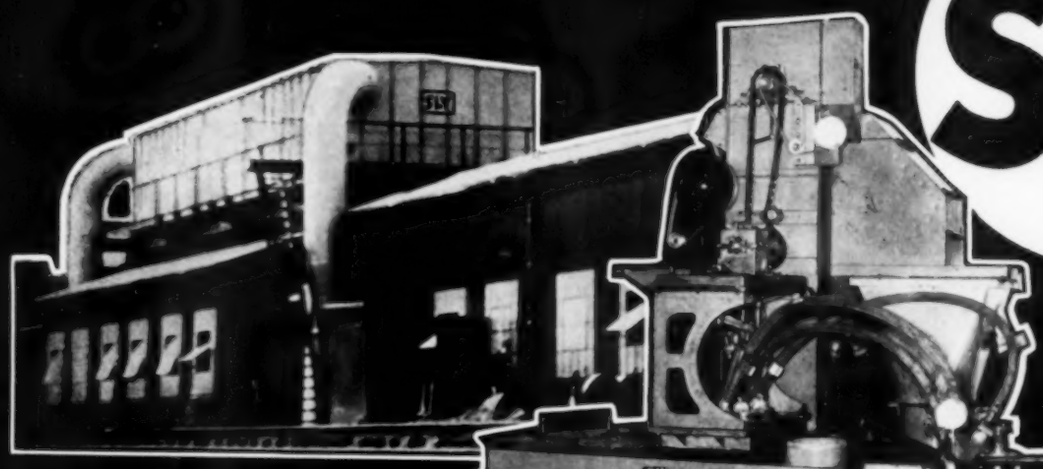

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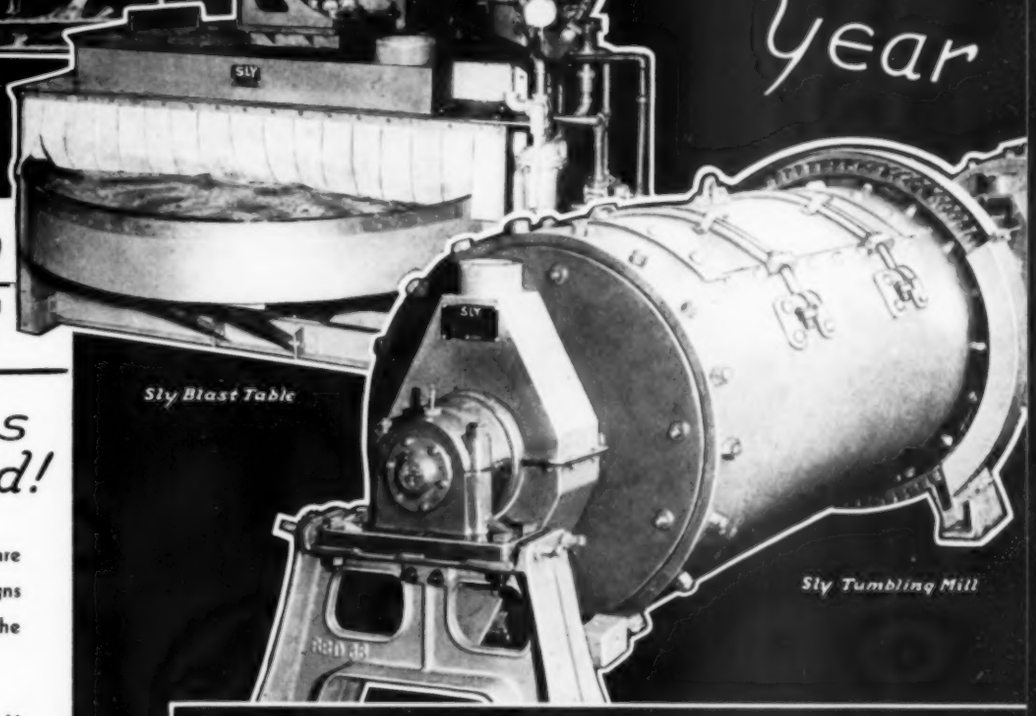

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(*Concluded from page 42*)

in electric furnace melting. In the case of the indirect arc furnace, it was stated that there was a loss of carbon particularly at high temperatures, but that it was gradual, and at a fairly definite rate so that the carbon loss could be adjusted. Fred J. Walls said that the loss in carbon depended upon the furnace operator, and the age of the lining. Consequently, through experience, fairly constant carbon content could be maintained.

Garnet Phillips, Frank Foundries Corp., Moline, Ill., stated that through the use of a chill test bar, the structure of the iron could be determined, and adjustments in composition made to obtain uniform iron from the furnace. Carl Joseph, Saginaw Malleable Iron division, General Motors Corp., Saginaw, Mich., stated that in duplexing with the cupola and direct arc furnace, there was little carbon pick-up when no slag cover was used in the electric furnace. With a slag cover there was a slight increase in carbon content.

One member mentioned the production of short cycle anneal malleable cast iron in the indirect arc furnace. The charge consisted of about 77 per cent of carefully selected rimmed steel stock with silvery pig iron and petroleum coke. The final iron contained 1.55 per cent silicon and 2.50 to 2.55 per cent total carbon. While the iron had a silicon content higher than found in the regular malleable cast iron, no difficulty was encountered from primary graphite. The higher silicon content aided in the reduction of annealing time, and with this iron, the time required was 22 hours.

Inquiry was made on the use of slags in melting iron in the indirect arc furnace. One member stated that he had been trying small quantities, but as yet not enough data had been secured to warrant a definite statement. However, so far the indications are that the use of slag appeared favorable. Information requested on the use of the high frequency type electric induction furnace in melting iron brought out the remark that while some work had been carried on along that line, it had not proceeded far enough to supply data on which to base definite conclusions.

Joint Meeting on Patternmaking

AN INFORMAL discussion of various problems encountered in the production of both wood and metal patterns featured a joint session of the Wood Industries division of the American Society of Mechanical Engineers and the American Foundrymen's association on Wednesday afternoon, under the chairmanship of Paul Bilhuber, Steinway & Sons, Long Island, N. Y.

W. H. Hill, Chesapeake & Ohio railroad, Richmond, Va., discussed informally several of his interesting early experiences in the production of patterns for railroad castings and touched upon the difficulties arising in that essential division of the foundry industry today. He stressed the importance of complete co-operation between the patternmaker and the foundryman.

Described Auto Patterns

Vaughan Reid, Detroit Pattern Works, Detroit, presented an interesting talk on numerous phases of pattern production for the automotive industries. He pointed out that before work is started on the pattern, all of the necessary planning is completed, including the method of molding, type of molding machine to be used, method of gating, etc. The blueprint is not allowed to go to the patternmaker, but remains in the inspection department, while a layout to size is made on sheet aluminum in such a way that any patternmaker may go ahead with the job. On production work, where a number of identical patterns are required, the original pattern is made from wood and then a master is cast in metal. The patternmaker producing the master pattern uses the same layout as the workman making the initial wooden pattern. However, the pattern is checked from the blueprint in the inspection department rather than from the aluminum plate.

Mr. Reid was emphatic in his statement that patterns should be produced from the best lumber available. He based this assertion on the fact that since the cost of the material is approximately 10 per cent of the total cost of the pattern, it seems unnecessary to waste labor to produce patterns from cheap materials which may not prove satisfactory.

To avoid pinholes, Mr. Reid stated that the aluminum never should be stirred or dipped from the pot. The metal should be melted in an iron pot and the mold should be poured directly from the melting pot. For the best results, he has found that a mixture of 3 per cent silicon, 5 per cent copper and the remainder virgin aluminum provides the most satisfactory alloy. This mixture is melted, pigged and later melted for pouring into the pattern castings. Metal should not be overheated, and should be poured as cold as possible. The company uses cabbage aluminum which is sheet metal made for automotive bodies, and also Swiss virgin aluminum.

It was pointed out that for patterns on which an exceptionally smooth finish is desired, white pine provides the best pattern lumber. Mahogany will serve best where the patterns must be kept in storage for a considerable length of time.

Tells Detroit Founders of Trip to Europe

Glenn Coley, Detroit Edison Co. and chairman of the educational committee of the Detroit Foundrymen's association, gave an interesting talk on some of the highlights of his visit to Europe at the regular meeting of the Detroit association held at the Savoyard club, Nov. 15, with Harry Rayner, Dodge Bros. Corp., and president of the association, presiding.

J. Mahon, superintendent, American Car & Foundry Co., Vaughan Reid, City Pattern Works, and President Rayner reported on the recent A.F.A. Philadelphia convention. The president stressed the remarkable interest shown in the technical sessions, and the educational value of that feature of the annual meeting. Mr. Reid conveyed the thanks of the A.F.A. to the Detroit Foundrymen's association for its welcome and entertainment of the overseas guests to the Fifth International Foundry congress.

R. E. Aptekar, consulting engineer, Ypsilanti, Mich., spoke on "Refractories for Cupola and Ladles." He demonstrated thoroughly the uses of various materials and explained the problems encountered. The discussion was lengthy and interesting, with the following members taking a prominent part: A. F. McClure, Semet Solvay Co.; Harry Dietert, U. S. Radiator Co.; P. W. Uhl, Atlas Foundry Co.; and F. J. Walls, International Nickel Co.

Denies Application For Exemption from Code

National Industrial Recovery board has denied applications of the Baldwin Locomotive Works, Philadelphia, and of the code authority for the machinery and allied products industry, for exemption from the provision of the gray iron foundry industry's code forbidding selling below cost.

Both applicants for exemption objected to defining costs by the gray iron foundry industry's uniform cost and estimating system. The board was informed by the deputy administrator in charge of the code that this requirement does not work a hardship, since the code provision permits use of any recognized system which conforms to the essentials of the industry's system.

Type JDP Jolt Power Strip Machine

Foundrymen

who select their Machines from the

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KNOW **that they can secure the proper machines for the work to be molded as there are—**

63 standard types of machines for castings
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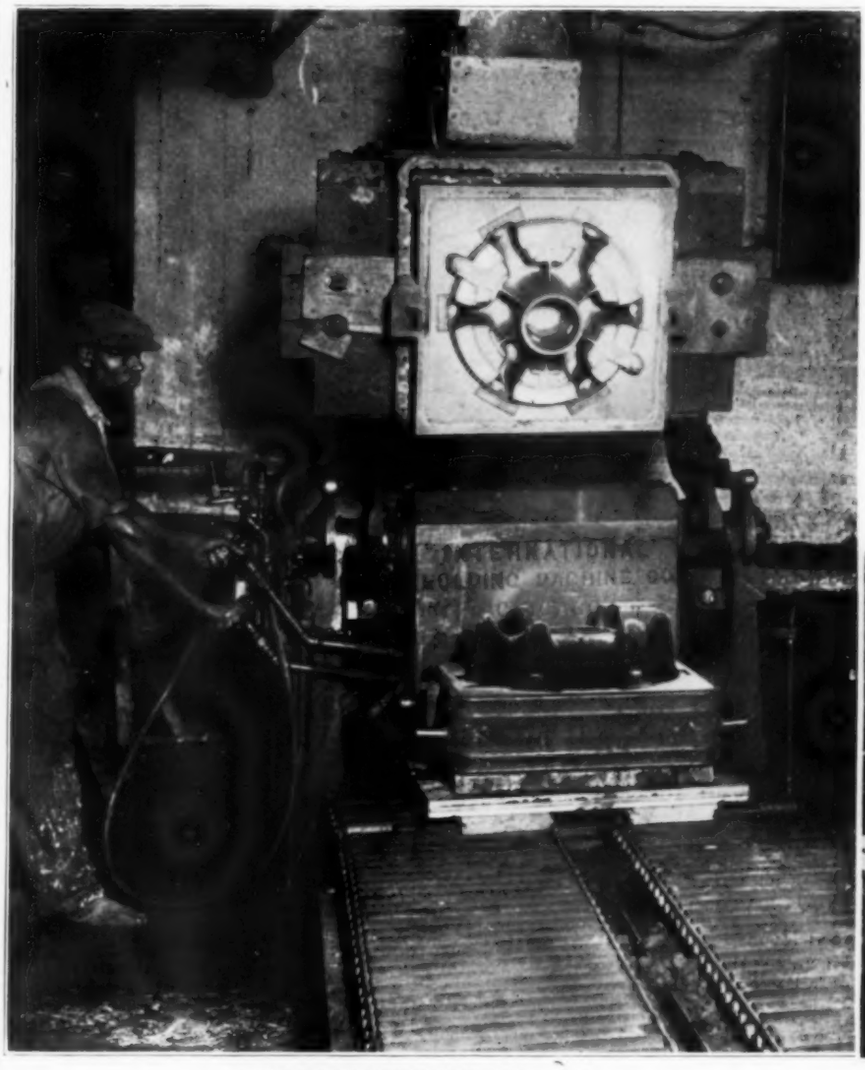

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Short Runs
Production work

Gray iron, Brass, Steel, Malleable and Aluminum castings

Shops equipped with conveyors and shops in which the molds are carried by crane or by hand

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Type SB Core Blower

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TRADE 1884 MARK

LATEST DESIGN TABOR TOP SQUEEZER

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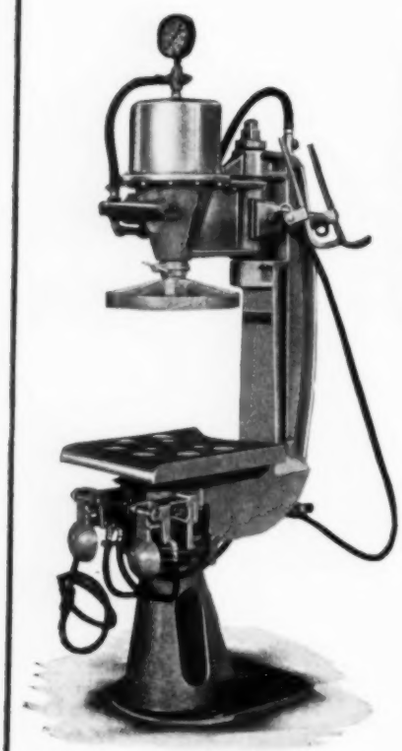
THE upright member is chrome molybdenum, exceptionally sturdy channel construction. Squeeze head centrally located over table. Ball bearing swing head. The jar mechanism mounted directly over the base provides rigidity which gains advantage of the full jarring blow. Unusually large wheels make the portable machine really portable. Each machine is furnished complete with vibrator, pressure gauge, blow valve, and pattern plate rack. In addition, the portable machine has a riddle rack and mold shelf. Vibrating and jarring valves are operated by knee control.



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WE DO OUR PART

1884 50th ANNIVERSARY YEAR 1934

Prevent Losses with

Proper Gates and Risers

BY PAT DWYER

ON MANY large castings the problem of gating is simplified to a considerable extent through nozzle limitation on the ladle. Even with the nozzle wide open the volume of molten steel passing through the orifice is regulated by the laws which govern the flow of liquid through any given size passage under definite pressure. Therefore no advantage is gained by providing a gate or a number of gates with a greater area than can be filled by the limited stream from the ladle. For that reason a single gate usually is sufficient to conduct all the metal required to fill the mold. With a view of introducing the first metal as gently as possible, the gate is placed at or near the bottom of the mold.

Metal Poured at Top

Theoretically the metal should be poured into the top of the mold to provide hot metal in the area where it is needed to compensate for the shrinkage, and in some instances the ladle is shifted from the pouring cup on the sprue leading to the bottom of the mold after a certain amount of metal has been poured. The remainder of the metal then is poured down through the riser. However, in the majority of instances this practice is not feasible, since a skin or film develops rapidly on the surface of metal not in motion in the mold. Interruption in pouring may result in cold shuts or missrun areas. In other instances the metal is poured through the bottom gate until it appears in the bottom of the riser or risers. The ladle then is shifted and the risers are filled directly from the nozzle. Method adopted in any given instance depends to a considerable extent on the weight, size and thickness of metal in the casting. Manifestly, an erratic or interrupted stream that would not adversely affect a large cubical casting, would produce nothing but scrap in the mold for a plate or other casting of equal weight, but thin metal section.

Although a single gate may be large enough to accommodate the full stream from the nozzle, still it is advisable in the majority of instances to provide one or more additional gates particularly on molds where the metal has to climb to a considerable height. The speed of metal entering through a bottom gate is retarded to a considerable extent by the back pressure of the metal already in the mold. This back pressure increases progressively as the height of the metal in the mold approaches the height of the metal in the sprue. This feature was considered from several angles in preceding installments of the present series dealing the gates and risers on steel castings.

Description of the methods employed in gating and pouring several large steel castings in various foundries appropriately may bring this present series to a close. Also the examples will serve to illustrate many of the points raised in the preceding discussion, and incidentally illustrate present day steel foundry practice in plants where large castings are produced.

In a prominent Mid-west foundry annealing boxes of the type used in sheet mills are gated at the bottom near one end as shown in Fig. 256. These castings vary to a considerable extent in size and weight up to a maximum weight of 15 tons. Corrugations on the sides, ends and top designed to resist cooling and heating strains and to prolong the life of the box are not shown in the present illustration, an elementary sketch of the drag supporting the built-on core. The entire mold includes a drag, a cheek and a cope.

The short sprue *A* in the drag is a continuation of a long straight sprue which extend upward through the cheek and cope. In making the mold, runner cores are bedded in the drag under the pattern and leading from both sides to the sprue as shown to the left in the illustration where *A* is the sprue, *B* is the runner and *C* is the gate. Detail of the cores is shown at the right where *F* is the runner core, *G* is the cover core, *E* is the gate core and *D* is a flat core which forms the fourth side of the gate and extends upward for a short distance in the face of the main core. This core *D* prevents the metal from washing away the sand in the vicinity. The facing sand on the large body of sand forming the inside of the casting is weak and the interior of the core is filled with coke to facilitate contraction of the casting. In some instances the core is made in green sand for the same purpose. The flutes or corrugations are formed by pieces of dry sand core attached to the sides and ends. In cleaning the casting, the dry sand peels more readily than green sand in areas where the contraction of the casting causes the metal to hug the sand closely.

Use Two Ladles

The most common type of open-hearth furnace in the steel foundry has a capacity of 25 tons, therefore the combined heats from two or more furnaces are required to pour castings exceeding this weight. Usually also in instances of this kind expediency or actual necessity suggests the use of two or more ladles so that the metal may be introduced simultaneously from both ends or both sides of the mold. Even where the required amount of metal may be melted in

(*Continued on page* 49)

Pour Large Volume

IN THIS the closing installment in the series dealing with steel castings, examples are presented of the manner in which gates and risers are applied to castings usually listed as heavy and ranging in weight from 5 to nearly 300 tons. Attention is directed to the fact that up to the present no rule has been developed whereby the total weight of metal in the risers can be calculated by using the weight of metal in the casting as a base. Economical operation suggests cutting down the riser metal as much as possible, but experience shows that it is safer to err on the other side and provide sufficient height and volume in the riser to adequately feed the casting. In proportion to their total weight large bulky castings usually require less feeding metal than light castings.

Business Men's PROSPERITY SURVEY

HERE'S a chance to give voice to your own ideas as to which national policies you believe most likely to speed recovery in your line of business.

BALLOTS like this are being published this month in many business papers affiliated with The Associated Business Papers, Inc.—reaching virtually all key men in every line of industry, trade and profession throughout the nation.

BUSINESS men, nationally, may appreciate an opportunity to express their convictions to a strictly non-partisan and impartial body—with the assurance that by so doing, business views will be presented effectively to the political, banking, industrial, business and labor leaders of the country.

QUESTIONS on the economic ballot below are prefaced with "In your line of business" to make possible an industry by industry study as well as a consensus of business opinion in all fields of industry—so let our industry be well represented in the responses.

ECONOMIC BALLOT

Check your convictions, sign, clip and mail this ballot.

1. As regards the possibility of Congress adopting a universal thirty-hour work week, do you favor such legislation? Yes ( ) No ( ); and if so on the basis of ( ) continuation of existing weekly wages, or ( ) continuation of existing hourly rates of pay.

2. In your line of business are you satisfied with enforcement of maximum hours and minimum wage provisions now in effect? Yes ( ) No ( )

3. In your line of business is there obtainable ample **working** capital—from banks? Yes ( ) No ( ); from government agencies? Yes ( ) No ( )

4. In your line of business is there obtainable ample **investment** capital—from banks? Yes ( ) No ( ); from government agencies? Yes ( ) No ( )

5. In your line of business do you favor limitation of industrial output—by government control? Yes ( ) No ( ); by industry control? Yes ( ) No ( )

6. In your line of business do you favor a plan for control of prices—by a code provision establishing price fixing? Yes ( ) No ( ); by a code provision establishing an open price plan? Yes ( ) No ( )

7. In your line of business do you think that government measures now in effect are **helping** small and medium sized enterprises? Yes ( ) No ( ); hurting such enterprises? Yes ( ) No ( )

Signed . . . . . .

Firm . . . . . .

Business . . . . . .

Please return this ballot to
The Associated Business Papers, Inc.
330 West 42nd St.,
New York, N. Y.

(*Continued from page 47*)

one furnace, the use of two ladles in pouring the steel either is obligatory or advisable.

Exceptions to this—and for that matter to every rule—are common in steel foundries. Instances are on record in practically every foundry, where emergency conditions have forced the foundryman to melt a heat greatly in excess of the rated capacity of the furnace and to pour it from a single ladle. However, under normal operating conditions the foundryman realizes that steel only will flow a certain distance and governs himself accordingly.

Mold Is Large Coreprint

The mold for a large forging press frame weighing approximately 40 tons is made in a pit in the floor and gated near the bottom at both ends as shown in Fig. 257. Pattern construction on this and other large jobs is held to a minimum by the expedient of forming the greater part of the mold in dry sand cores. With the exception of a few limited surfaces closely reinforced with nails, the entire mold simply is a glorified core print. Facing sand is employed on the surface exposed to the metal, but the straight walls at the ends and sides and the greater part of the bottom are formed from heap sand. Vent from many of the cores is taken through a coke bed under the mold. Vent from the remainder of the cores is taken either through the cope or through vertical channels cut in the walls of the mold. Two 3-inch diameter tile runners conduct the metal simultaneously from two ladles into the bottom of the mold at both ends. The mold is covered temporarily with a number of thin steel sheets and dried with a number of gas jets to a depth of 3 or 4 inches. The metal is melted in two furnaces.

The casting shown in Fig. 258 is the center section of a large butterfly valve for a water power development and weighs over 63 tons. It

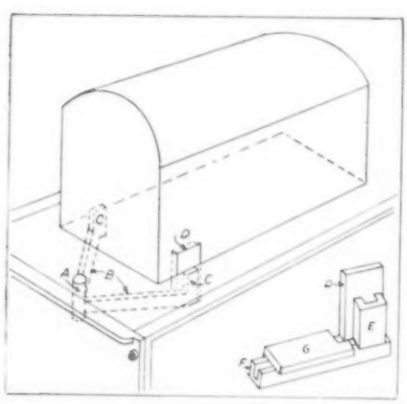


Fig. 256—Metal enters the mold through gates at the bottom near one end

was gated in a similar manner at both ends near the bottom and in the center of one side. The entire capacity of three 25-ton furnaces was required to melt the steel which then was poured from three ladles. The casting is 27 feet in length, 10 feet wide and 5 feet through near the center. The interior is hollow reinforced by longitudinal and transverse ribs.

Numerous Sink Heads

A simple one piece box pattern was employed to form the outside of the mold in a concrete pit in the floor. Slots along the sides and all the ribs on the interior were formed by a set of dry sand cores. Core prints and chaplets anchored the cores in place. The mold was dried for several days by a number of gas jets. The cores then were set in place according to a numbered blueprint. Sink heads were built up on the cope to feed approximately every 10 square feet on the top and were arranged in three longitudinal lines.

Normal contraction on a steel casting 27 feet in length is 6¾ inches. The sloping shape of this casting presented no impediment to contraction on the outside. A space was cleared around each sink head before contraction commenced. The cores were faced with a highly refractory sand, but the insides were filled with coke and old sand without any binder. Consequently these cores crushed easily and allowed the casting to contract normally. The castings remained in the molds for a week and received no further annealing treatment.

Although the volume of metal in the sink head of a large casting may seem excessive, in many instances it is not as great relatively as the amount in the heads on smaller castings. For example consider the anvil block for a hammer which weighed 95 tons. The single feeder on this casting, 4 feet in diameter extended upward for a distance of 6 feet above the casting and weighed about 16½ tons, that is 16 per cent of the weight of the casting. On many small castings the weight of metal in the head may equal the weight of metal in the casting. Hence the utter impracticability of the suggestion occasionally offered by enthusiastic amateurs, that a standard rule can be worked out for feeding heads based on the weight of the casting.

Ten feeding heads weighing 500 pounds each, or a total of 5000 pounds were placed on the 9000-pound deck ring shown in Fig. 259. The casting was gated at two diametrically opposite points near the bottom and the metal was poured from two ladles. The mold was made up of a series of dry sand cores mounted on a loam foundation. The lower flange is flat but the upper flange is curved and in addition is sheered and cambered to coincide

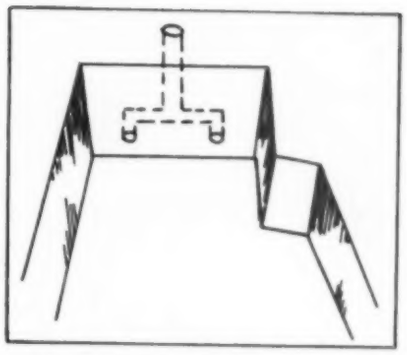


Fig. 257—The mold cavity is a large frame in which the cores are assembled to form the casting

with the deck around the turret on a 10,000-ton cruiser.

Unequal and erratic contraction characterized these castings on the first attempts to secure a perfectly round ring 23 feet in diameter in which it must remain round to a tolerance of ½-inch in diameter, with a similar limitation on the maximum and minimum wall thickness. On a circumference of 72 feet the approximate contraction is 13 inches, but the first casting showed that a shrinkage of 5/32-inch per foot was not sufficient. On the next attempt this was increased to 3/16-inch and was quite satisfactory.

Interesting detail of the many and peculiar difficulties encountered in the production of these castings appeared in THE FOUNDRY, May 1, 1929. Sufficient for the present purpose to state that it was found utterly impossible to cast a perfectly round ring. The desired result was secured in the annealing operation. A special furnace was constructed to heat the distorted ring to the required temperature of 1650 degrees Fahr. An 8-side cast iron hub was set up in the center of the space bounded by the inner wall of the furnace. Eight steel bars were arranged radially, with one end against the casting and one end against the hub.

Regulated Ring Contraction

The casting was raised to the annealing temperature and allowed to soak for approximately two hours. The eight bars carefully set were brought up hand tight with wood wedges. After checking the diameter at four points the wedges were left just tight on the long diameter, but each short diameter was brought into agreement by driving the graduated wood wedge behind each bar with a hammer. Shape of the casting at this temperature is controlled easily and no great effort was required to set the casting to a true circle. As the casting cooled and contracted the wedges were eased. Where greater contraction showed on any diameter the wedges were held tight until the contraction on the other diameter was equal, then all wedges were

cased together. This method of control was observed until the casting had passed below the 1000-degree temperature. The rings were held to a true circle within a limit of less than ¼-inch.

In connection with the gating of these castings and lacking experimental data it is idle to speculate on what the probable results would have been, had the castings been gated at say four or eight points instead of at two diametrically opposite points. The point is debatable, but as with many other debatable points, only can be settled by actual trial. Incidentally, foundrymen who are doubtful of the distance molten steel will run in a comparatively thin section, will be interested to note that in this instance the steel flowed freely for a distance of 18 feet on either side of each gate.

Use Cooling Rods

To attain uniform cooling speed and also to reduce the size and number of feeding heads foundrymen are accustomed to place rods or other internal chills in the mold. Consider a typical case, a ring with an outside diameter of 46 inches, inside diameter 36 inches and 20 inches deep surrounded by 16 projections 6 x 7 inches, almost the full depth of the ring and spaced equidistantly on the perimiter. The casting is perfect in every particular with the exception that the presence of the cooling rods could be detected after the face of the casting is machined. Customers have been known to claim that the rods weaken the casting and refuse to accept it.

Without a knowledge of all the factors involved including the purpose for which the wheel is intended it is impossible to say whether the customer is justified in his stand. If the wheel is designed to travel slowly or to carry a light load, the numerous cooling rods will not affect it adversely. If the wheel travels at high speed or carries a heavy load the rods may constitute a menacing factor. Cooling rods are employed freely in steel foundry practice, but discretion is observed in regard to the castings in which they form a part. The spirit of economy prompts every foundryman to cut down on the size and number of feeding heads on steel castings, but under certain circumstances, large heads, numerous heads, or both are absolutely essential.

What is claimed to be the largest steel casting in existence was produced at the Lehigh plant, Bethlehem, Pa., of the Bethlehem Steel Co., Inc., a few years ago. This huge upper platen for a hydraulic press is 10 feet 2 inches wide, 12 feet 10 inches high and 23 feet 4 inches in length. Estimated weight of the casting is 230 tons. Gross weight of metal in the casting, including sink heads, runners and gates was 290 tons.

Gated at Ends and Side

Gate openings 4 x 4 inches were built in bricks at two points on the lower flange on one side and at two points near the bottom at each end. The end gates opened into large square lugs designed and attached to the casting specifically for the purpose of facilitating handing in the several stages of the journey between the casting pit and its position as the upper member of the forging press. Supplementary gates were arranged at points half way between the top and bottom and at the top flange.

The sprues in 6-inch diameter tiles were built up in sections as the ramming of the sand progressed. After the mold was closed and weighted, long runner basins had to be erected at the ends and at one side for the simultaneous pouring of metal from four ladles, each ladle suspended from a traveling crane and every crane running on the same runway. These runner basins were formed in sand in long steel flasks and were dried. Temporary piers made up of empty flasks and short sections of rails supported the runner basins in a slanting position that insured rapid movement of the metal from the outer end to the inner end where it entered the vertical sprue leading to the gates.

Tapped Six Furnaces

Steel from four large furnaces was tapped into four ladles which were carried to the mold and emptied. Contents of two smaller furnaces, approximately 60 tons were tapped into a single ladle and held there until one of the end ladles was emptied. The crane was disengaged from the empty ladle and attached to the fifth ladle. The metal from this ladle was poured into the sink heads, one over each column and two over the center.

Each column sink head was 50 inches in diameter, 5 feet high above the cope with a continuation of a 24-inch diameter core through the center. Sink heads over the center section of the casting, rectangular in cross section 36 x 48 inches were the same height as the others. Total pouring time, that is the elapsed time between the lifting of the first stopper and the entrance of the last drop in the sink head occupied 38 minutes.

This is the fifty-eighth of a series of articles dealing with the various types of gates and risers used in the foundry industry. The fifty-ninth will appear in an early issue.—The Editors.

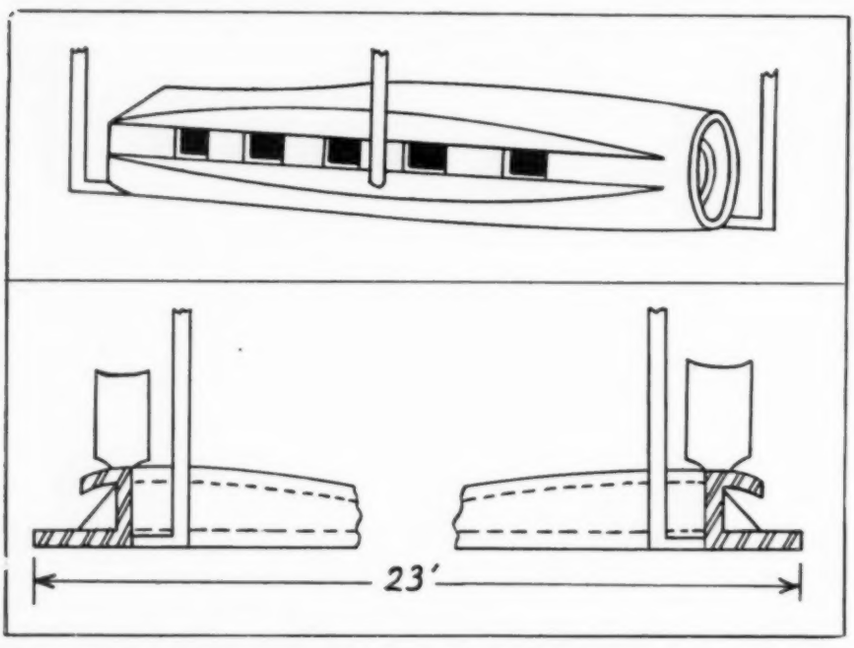


Fig. 258 (Above)—Perspective view of center section butterfly valve. Fig. 259 (Below)—Sectional view deck ring casting

Made Assistant General Sales Manager

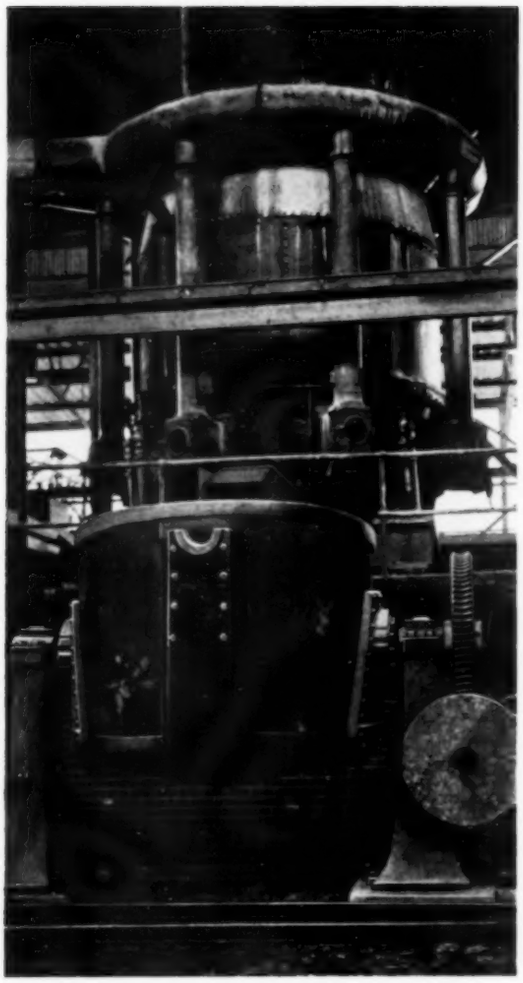
Paul H. Shaeffer has been made assistant general manager of sales, Ohio Ferro-Alloy Corp., Canton, Ohio. Mr. Shaeffer has had many years of practical steel making experience, primarily through association with the Central Steel Co., Massillon, O., and the United Alloy Steel Corp., Canton, O.

Speaks on Alloys

Dr. V. N. Krivobok, professor of metallurgy, Carnegie Institute of Technology, and recently appointed associate director of research, Allegheny Steel Co., spoke at the regular meeting of the Chicago chapter of the American Society For Metals on Nov. 8, on the subject "Alloys of Iron and Chromium."

Cupola Problems

Problem No. 2—To SPEED UP Production



Blast furnaces had the same problem, which was solved successfully through the use of preheated air. Blast furnaces now melt iron ore by the heat from coke and preheated air supplied by a recuperator. The heat returned to the furnace by the preheated air increases the temperature inside the blast furnace, and thereby so materially speeds up production, that no operator today would think of operating a blast furnace without preheated air.

Use of preheated air is as logical for the cupola as for the blast furnace, but no preheated air could be provided for the cupola until the *Griffin hot-blast process* was introduced. The *Griffin hot-blast process* applies the same principles to cupola operation that have been recognized for years in both blast furnaces and power plants as absolutely necessary if operation is to be economical and efficient. The most modern foundries today are using the *Griffin hot-blast process* and realizing handsome financial returns.

A faster melt is only one of the many desirable features provided by the *Griffin hot-blast process.* Write for full information—no obligation.

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Proposes Steps To Speed Recovery

(*Concluded from page* 17)

ministration would improve. Mr. Jordan warned that with prevailing attitudes at Washington, industry was in no trading position—that if such was attempted it would lose more than it had when started.

Rapidity in the ultimate economic recovery depends on elimination of two forces now retarding recuperative efforts, according to F. H. Clausen, the Van Brunt Mfg. Co., Horicon, Wis., and vice president of the association, who has been active in code administration at Washington. These are: Lack of confidence in industry by the national government and lack of confidence by industry in some of the alleged recovery plans of the government. Mr. Clausen is code director of the farm machinery industry.

Non-compliance by some industries with codes has grown by leaps and bounds in relation to those provisions outlining rules of fair competition in the distribution of competing products of industry, said Mr. Clausen.

Should Not Be Continued

The NIRA should not be re-enacted or extended in Mr. Clausen's opinion He said:

This law was enacted as an emergency measure and its continuation with recognized nonobservance will serve to prolong the emergency it was designed to mitigate. The increasing inability of some code authorities and NRA to enforce compliance with approved fair trade practice provisions directly implies that many code provisions which were voluntary in form are not so in fact. Any code system, without a general and affirmative support of the industries to which it applies, will fail through increasing nonobservance, and will continue a condition of uncertainty and lack of confidence.

It has been suggested by the administration that "the functions of the recovery act which have proved their worth may be made a part of the permanent machinery of government." Inasmuch as business itself must assume the obligation of compliance with the permanent laws enacted to control its operation, it has a like obligation of expression as to the form much proposed legislation may take.

New legislation, when enacted, should provide that each industrial group may formulate and put into effect rules of fair competition subject to governmental approval.

In Mr. Clausen's view the initiative and the responsibility should be upon industry itself. Not only the original initiative, but also all developments and changes up to the point of governmental approval should belong solely to industry. Those actively and responsibly engaged in an industry have that understanding of problems which is necessary if rules of industry conduct are to promote sound conditions in the industry.

In discussing financial aspects of the new deal J. A. Milholland, vice president of the Manhattan Co., New York, stressed the mounting government debt.

Commissioner A. E. McClintock reported 11 new members during the year, with 8 reinstatements and 20 having resigned or retired from business, a net loss of one.

Periodical physical examination of old and new employes for the detection of possible silicosis was advocated by E. O. Jones, consultant on industrial relations of the association. Mr. Jones has visited 200 plants of members during the year. He indicated such physical examinations, already accepted as definite policy, indicated silicosis detected were far out of proportion to the number of suits filed for compensation.

F. Robertson Jones, general manager, Association of Casualty and Surety Executives, New York, discussed problems of compensation for occupational diseases. In some states, Mr. Jones declared, workmen's compensation laws had developed into a medium for a racket and an excuse for the enactment of social insurance laws, the latter being grafted to the compensation statutes. In the matter of occupational disease insurance the speaker favored the establishment of a medical tribunal, free from politics, and empowered to establish a list of such occupations.

David R. Clark, Fyffe & Clarke, Chicago, spoke on "The Collective Bargaining Bugaboo—What is the Law Today."

Lists Hazardous Occupations for Minors

A list of occupations deemed hazardous to persons under 18 years of age in the secondary aluminum industry has been approved by the National Industrial Recovery Board and was scheduled to become effective Dec. 9, unless good cause to the contrary was presented, according to a recent announcement of NRA.

Occupations deemed hazardous for minors are all work in foundry proper; cleaning and grinding operations; work involving exposure to molten aluminum; employment on metal scrap; employment as drivers or assistants to drivers on motor vehicles or as helpers or delivery boys on motor vehicles; in or assisting in the operation of gas, oil or steam engines or other prime movers; in care, custody, operation or repair of elevators, cranes, derricks, or other building apparatus; in oiling, cleaning or wiping machinery or shaftings in operation; in applying belts to pulleys in motion or assisting therein.

Navy and Marine Memorial Is Aluminum

(*Concluded from page* 16)

was considered finished and ready for shipping. On location the sections were re-erected, the birds being held in place by a sturdy metal support running through the interior of the statue, firmly moored to the concrete base.

The various sections were caulked on the inside to provide moisture-proof joints, prior to application of an inhibitive primer and aluminum paint. After the group was erected, the exterior surface was gone over with wax to bring out its delicate finish. The completely assembled statue weighs approximately 10,000 pounds.

One of the reasons why aluminum is being used as a statuary metal is because it is free from drip-stains and thus does not disfigure a statue's base.

Quad City Group Holds Joint Meeting

Joint meeting of the Quad-City American Society for Metals was held at the New Harper hotel, Rock Island, Ill., Nov. 19, with 125 present for the dinner and over 250 attending the meeting. Clyde Burgston, Deere & Co., Moline, and president of the Quad-City Foundrymen's association, presided.

Lieut. Donald P. Booth, U. S. engineering corps gave a brief and interesting talk on the importance of the Mississippi development. The problem of the Quad-City community, he stated, is largely one of navigation, while that of the south is flood control.

Dr. J. S. Vanick, research department, International Nickel Co., New York, spoke on "Hardening of Cast Iron." The speaker covered five different methods of hardening iron.

The next meeting of the Quad-City Foundrymen's association will be held at Davenport, Iowa, Dec. 17.

Made Vice President

G. G. Coolidge recently was elected vice president and director of the Harbison-Walker Refractories Co., Pittsburgh. Mr. Coolidge became connected with the Pittsburgh sales office of that company in 1906, was made district sales manager in 1911, assistant general sales manager in 1924 and assistant to the president in 1929.

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RAILROAD EQUIPMENT

Job: Side Frame
Production: 370 molds per day for two nine-hour shifts or 185 molds per shift. This is average daily production for one month. Largest number of molds produced in one shift is 210. Flasks are approximately 3 ft. x 9 ft. x 1½ ft.
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DESIGNERS AND MAKERS OF FOUNDRY EQUIPMENT

Foundry Doubles Plant Capacity

(*Concluded from page 22*)

chines are placed on the cored drags as they pass by. One side of the drag is cut out to conform to the contour of the end of the crankcase core. A corresponding projection on the cope fits into this gap. The joint opening between cope and drag is sealed by a thin casting made up of a lower horizontal member and three upright members held in place by lugs on the flask. For additional security the edges of this casting are daubed with clay.

As the molds pass a given point, an attendant adjusts the clamps, small metal blocks with tapered cavities on the inside which fit on wedge shaped lugs on the flask. Another attendant places a green sand runner basin over the sprue. These runner basins are jolted in pairs on a small plain jolt machine located close to the last cope machine in the line. After they have served their purpose they are removed from the molds. The sand is knocked out and the frames are returned to the jolt machine to be refilled. Clamps also are removed at this stage and trucked back to where they are required.

Use Green Sand Basins

Formerly dry sand basins made in the core room were used exclusively. It is claimed that the green sand basins are just as satisfactory, besides representing a considerable saving in time, sand and oven space. Sand in the dry sand basin served only once, then it was discarded. Green sand is used continuously.

From the pouring basin the metal falls through the sprues in the cope and through a continuation of these sprues through the crankcase core to a horizontal runner extending the entire length of the casting. A number of small, thin gates admit the metal from the runner to the lower edge of the crankcase. A small auxiliary gate formed in the core helps to carry the metal more rapidly to the far end of each barrel.

Circular castings, pressure plates, clutch ring covers, flywheels, etc. are poured through a gate in the center provided at the bottom with a strainer core. This strainer core is pierced with a number of small openings sufficient in area to convey metal to the largest casting. Where this volume is to be retarded on the smaller castings, a small teat of green sand in the bottom of the core print closes as many of the small openings as may be desired.

Transmission housings with internal flanges which in ordinary practice would require dry sand cores, are molded entirely in green sand in two part flasks on molding units made up of a drag, a core and a cope machine. A plain, flat drag is made on one machine and passed to the operator who has rammed the core on the second machine. The core contains the impression of the flanges on the upper face. The drag is placed in position on top of the core and then the combination is rolled over and placed on the conveyor. The cope made on the third machine then is placed in position over the core and drag.

In another type of housing in which the core does not present a flat bearing for the drag, the two parts of the core are made in a hinged corebox. One part is swung through an arc of 180 degrees and deposited on the other part. The swinging part of the corebox then is returned to place leaving the exposed mound of sand resting on the sand in the second half of the corebox. A drag mold made on an adjoining machine is placed over the core and the assembly is rolled over, then removed and placed on the conveyor, where the combined core and drag are covered by a cope made on a third machine in the vicinity. Metal enters these molds at a point near the lower edge.

Extent to which perfection in sand composition and preparation has been attained is reflected in the fact that these cores require few or no rods nor vents. The cores are rammed quite hard to resist the upward pressure of the metal, and to insure a uniform and predetermined thickness in the casting, yet the metal lies against them quietly and the sand peels freely from the resulting smooth, clean face of the castings.

Piston Cores in Green Sand

Piston castings are molded entirely in green sand, open end down and with the green sand cores forming an integral part of the drag. The empty drag flask is placed on the upper face of a rollover machine containing the coreboxes on the lower side. Equipped with two special rammers containing openings to pass the bosses, the operator rams the sand in the cores by hand. The drag then is filled with sand from an overhead hopper, jolted and scraped off flush. A device with four vent rods suspended from a spring is pulled down, adjusted in suitable guides and forced down to form a vent opening in each of the cores. An iron plate with vent ribs on the face is placed on the drag and the assembly is rolled over. The loose bosses are stripped through the sides of the core boxes and the drag with cores in position is lowered from the machine and placed on a stand provided for the purpose. An attendant lifts the drag from the iron vent plate and places the drag on the conveyor, where it is covered with a cope made on an adjoining machine.

Tappets must be machinable over certain areas and yet present a hardness of 56 on a *C* Rockwell scale on the bottom or working face. To secure these somewhat contradictory properties, the manganese content of the iron is raised to approximately 1.00 per cent and the lower face of the casting is chilled on a plate. A number of these plates, scored on the face for vent passages, remain constantly on the conveyor and serve as drags for the molds.

Dry sand cores to form the inside of the tappets are mounted vertically in a jig. The cope flask then is placed in position, filled with sand and rammed. The sand grips the exposed ends of the cores firmly and holds them in position when the cope is lifted and placed on the chill plate. A quick test is made of each ladle of metal before it is poured into the molds. A small quantity is poured into a mold chilled at one side. The test is cooled in water and broken and the depth of the chill noted. If necessary, minor adjustments are made to the metal.

This is the third of four articles dealing with the Chevrolet foundry of the General Motors Corp., Saginaw, Mich. The last of the series will appear in an early issue. THE EDITORS.

Elect Officers of Northern Illinois Group

F. E. Rundquist, Greenlee Brothers Co., Rockford, Ill., was elected president of the Northern Illinois Foundrymen's association at the annual meeting held Nov. 20 at Elks' club, Rockford. H. S. Bennethum, Stover Engine & Mfg. Co., Freeport, Ill., was named vice president; G. J. Landstrom, Sundstrand Machine Tool Co., Rockford, secretary and treasurer; and P. A. Paulson, Gunite Foundries, Rockford, technical secretary. Directors include the following: C. A. Nass, Fairbanks-Morse Co., Beloit, Wis.; G. H. Lindgren, Mattison Machine Works, Rockford; and W. Pfanstiel, W. F. & John Barnes Co., Rockford.

Harry Strain, general superintendent, blast furnaces, Illinois Steel Co., gave the principal talk of the evening on the operation of blast furnaces.

Causes Accidents

Improper use of artificial light caused an occupational accident every 46 seconds and a fatal accident every hour in America last year according to D. W. Atwater, Westinghouse Lamp Co., East Pittsburgh, Pa. If the light source is inadequate or produces blinding glare, it induces eye-strain and causes the worker to misjudge and err.

Controlling Dry Sand Strength

(*Concluded from page* 25)

A shows a material increase in dry sand strength from 1000 to 1800 degrees Fahr. insuring a superior casting finish. It also has a low dry sand strength at temperatures below 1000 degrees Fahr. which will allow easy shakeout of the backing sand.

Temperature to which a molding material must hold its dry sand strength has not been determined definitely. Study of molding materials under elevated temperatures is well under way and many practical facts undoubtedly will come to light.

Dry sand strength of a production sand can be controlled within practical limits by using two new natural molding sands, one a sand low in dry sand strength and the other high in dry sand strength. Proportioning new sand additions between these two sands enables one to hold the dry sand strength of the production sand at the desired range, since dry sand strength in most foundries need be held only above a certain minimum. The usual practice is to have a new molding sand or bonding material which possesses sufficient dry sand strength to cause the production sand to possess a dry sand strength well above the minimum.

Use of chemicals to raise or lower the dry sand strength of sand in foundries has not been introduced. However, a number of chemicals are known which affect the dry sand strengths markedly, and at some future day some practical application may be made.

Surface Appearance Important

Foundrymen now appreciate that every sand molded casting is formed in dry sand. This explains the attention which the practical man, in an endeavor to produce better castings at a lower loss, is paying to the dry sand properties of a mold, such as dry permeability, dry sand strength, expansion and surface retention. The relation of casting appearance and defects to dry sand strength is of particular interest at this time.

Surface appearance or finish of a casting has much to do in winning the "Casting Desire", which is so essential these days to retain and create a market for castings. The finish of a casting is dependent largely on fineness of the sand, ramming and refractoriness. Nevertheless, if the dry sand strength is at a low value, the casting surface will show defects of various designs from washes and cuts to rat tails and penetration, regardless of the fineness and refractoriness or how it is rammed. Compactness or mold hardness does much in aiding the dry sand strength to hold each sand grain in its place, but it cannot accomplish the full requirement without dry sand strength. Medium high-dry sand strength is inductive to better casting finish.

Sand grains that are held in place by dry sand strength are not cut and washed by molten metal. Dry sand strength in a mold is obtained by an inherent property of the molding material, the temperature of the material, ramming, and drying. A suitable combination of these items as measured by dry sand strength will prevent many cuts or washes. The casting defect *drop* is not to be charged to dry sand strength inasmuch as that is a mold failure in the green state.

Probably the most prevalent casting defects are known as *scabs* and *buckles*. At present the most practical measure for preventing these defects is control of moisture and green strength. A high reading of either is inductive to a condition in the dry state which will cause mold surface failure.

Hot casting cracks may at times be caused by an excessive dry sand strength, whether by the core or mold. This is more prevalent in malleable, steel and aluminum castings.

Metals poured at low temperatures, for example, aluminum, do not possess sufficient heat to break down the excessive low temperature dry sand strength of many molding materials. Where dry sand strength does not decrease quickly at the temperature of the molten metal, a cracked casting may be expected when casting surrounds the sand.

Another combination where excessive dry sand strength may cause a cracked casting is where castings are poured with metal at high temperature. If the metal has a high shrinkage and sets rapidly before sand has lost sufficient dry sand strength to allow for shrinkage, a crack may result.

The manual effort to shake-out molds is taxing. As a rule the labor cost may be held to a minimum if the sand in the mold does not set too hard. This condition may be present in floor foundries where molds set and are allowed to dry out. Should the low temperature dry sand strength become excessive, the backing sand in the mold will set firmly, causing additional labor in shake-out.

When the dry sand strength of production sand is determined once each week, giving ample opportunity to check either a trend to increase or decrease from the ideal range, it has been proven in many foundries that better castings are made with a lower loss and a reduced cost.

H. P. McCann, formerly president and general manager, McCann-Harrison Corp., Cleveland, has become associated with the C. O. Bartlett & Snow Co., Cleveland. During the past 18 years Mr. McCann has been identified with the development and manufacture of large continuous industrial furnaces as well as air heating equipment for baking and drying ovens and space heating.

Copper Aids Grain Structure

(*Concluded from page* 23)

elements in the iron. For example, in the presence of 12 to 15 per cent nickel, as much as 6 to 7 per cent copper is dissolved readily. Actually an alloy containing those proportions of the two elements is one of the most important of the austenitic cast irons, and for that reason probably is the most important example of the addition of copper to cast iron.

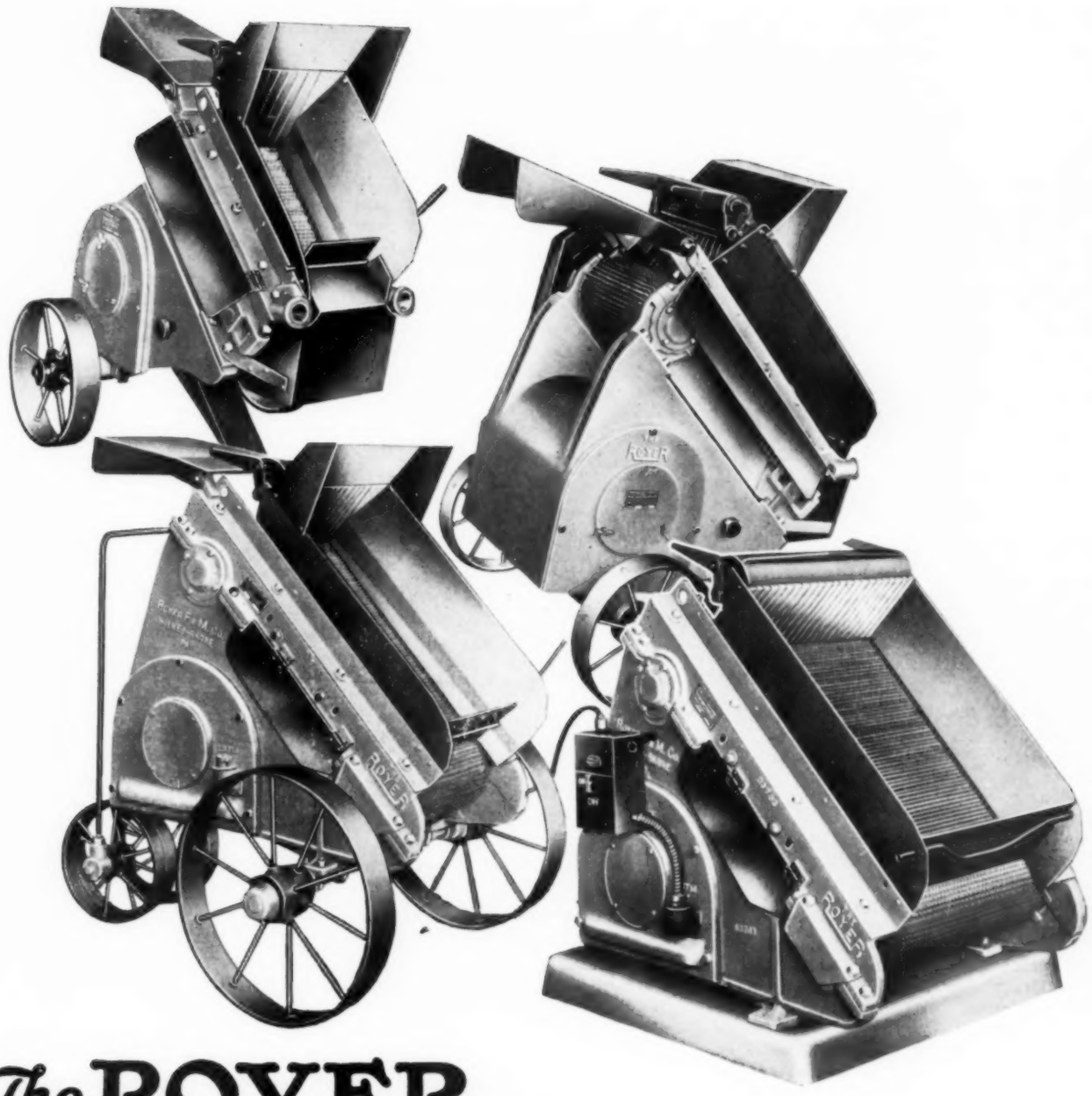
Mr. Hurst also pointed out that most investigators agree that the influence of copper additions resemble in many respects those of nickel additions, and that his own investigations appear to substantiate that view. He has studied the influence of copper additions in conjunction with chromium and has found an approximately regular influence in reducing the hardening effect of chromium. In view of the resemblance between copper and nickel Mr. Hurst believes it is probable that the greatest value of copper additions to cast iron lies in their use as a diluent of the nickel additions. For many purposes, he stated, copper is perfectly satisfactory in that respect and equal parts of proportions of 2 per cent nickel and 1 per cent copper can be used to replace equivalent total nickel additions.

Plain copper alloy cast irons are used direct for motor cylinder manufacture, according to Mr. Hurst, and a 2 per cent copper cast iron is recommended frequently for use under mild corrosion conditions. Improvements in corrosion resistance under various conditions of up to 25 per cent have been reported in the case of certain copper cast irons.

Matchplate Alloy

An alloy for matchplates is as follows: 90 per cent aluminum, 7 per cent copper, 3 per cent silicon. If a softer mixture is desired, use 93 per cent aluminum, 4 per cent copper, and 3 per cent silicon.

For aluminum solder and alloy, 56 per cent tin and 44 per cent zinc may be used. White metal patterns may be made of that solder or from the following mixtures: 87 per cent lead and 13 per cent antimony, 88 per cent tin, 8 per cent antimony and 4 per cent copper; 80 per cent lead, 10 per cent antimony, and 10 per cent tin.



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Pittsburgh Group Discusses Rate Setting

A spirited discussion on foundry rate setting followed an address by T. M. Harrison before a meeting of the Pittsburgh Foundrymen's association's held at the Fort Pitt hotel, Pittsburgh, Monday evening, Nov. 19.

Mr. Harrison, Cleveland manager of Stevenson, Jordan & Harrison, New York, management engineers, addressed an enthusiastic assemblage of approximately 100 members and guests on the subject of "Scientific Rate Setting in Foundries". One of Mr. Harrison's engineering associates joined in the discussion which followed and provoked many different lines of thought from those attending.

C. T. Zinsmeister, assistant auditor, United Engineering & Foundry Co., Pittsburgh, and president of the Pittsburgh chapter of the National Association of Cost Accountants, led the discussion following Mr. Harrison's address. Frank J. Lanahan, president of the Fort Pitt Malleable Iron Co., Pittsburgh, gave the closing address of the meeting.

Bulletin Presents Research Data on Steel

Four co-operative bulletins recently have been published by the Carnegie Institute of Technology and the Min ing and Metallurgical Advisory board as follows: "Effect of Deoxidation on the Rate of Ferrite Formation On Plain Carbon Steels," by C. H. Herty Jr., M. W. Lightner and D. L. McBride; "Effect of Deoxidation on Grain Size and Grain Growth in Plain Carbon Steels," by C. H. Herty Jr., D. L. McBride and S. O. Hough; "Effect of Deoxidation On the Aging of Mild Steels," by C. H. Herty Jr. and D. N. Daniloff; "Effect of Deoxidation on the Impact Strength of Carbon Steels At Low Temperature," by C. H. Herty Jr. and D. L. McBride. These bulletins may be obtained from the Carnegie Institute of Technology, Pittsburgh, for 50 cents each.

Book Review

Handbook of Chemistry, by Norbert Adolph Lange, fabricoid, 1542 pages, published by the Handbook Publishers Co. Inc., Sandusky, O., and supplied by THE FOUNDRY, Cleveland for $6.00 plus 15 cents postage and in Europe by the Penton Publishing Co., Ltd., London.

In editing this volume, an effort has been made to select material to meet the needs of chemists who cannot command the unlimited time available to the research specialist, or who lack facilities of the large technical library. Although the compilation is arranged primarily to meet the needs of the chemist, it is believed that workers in allied sciences—physicists, mineralogists, engineers and others—will find much data of material interest and value.

Among the special features of interest included in the volume are the following: Hazardous chemicals and their handling; changes in atomic weights 1933 to 1894; a new mineral table; organic radicals, physical constants of organic compounds; a special selection of tables for water chemists, a table of alloys including corrosion resisting alloys; materials of construction, x-ray tables; an unusually complete table of conversion factors, and a workable index containing over 2500 listings.

It is to be regretted that more attention has not been paid to castings in the section devoted to materials of construction.

Commemorates Fiftieth Anniversary

An attractive booklet entitled *The Fiftieth Year* has been published by the Harnischfeger Corp., Milwaukee, commemorating the company's golden anniversary. The book tells the story of a group of pioneers whose achievements are woven into the industrial drama through foresight and tireless effort. Many photographs are reproduced to introduce the personnel, the plant, and the wide variety of products produced by that company.

The accompanying illustration shows the first trimotored crane designed and built by the Harnischfeger Corp., which has been in service for the past 44 years in the Union Pacific shop at Cheyenne, Wyo. In the 44 years of continuous service, the only changes to this crane have been modernizations of the control mechanism and hoist motor.

Cast Large Bronze Centrifugally

(*Concluded from page* 19)

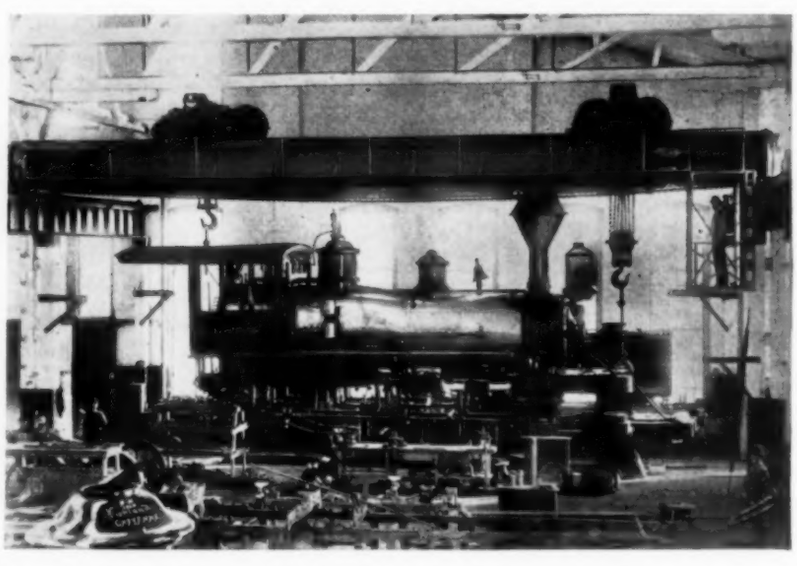
Thus in this foundry large quantities of metal are converted into practically uniform castings. An advantage claimed is the elimination of waste and expensive machining operations. In Bethlehem's extensive machine shops these castings are machined and furnished in the rough bored and rough turned, rough bored and finished turned, finished bored and rough turned, finished bore and finished turned, and straight, taper or step bored as the customer stipulates.

Made Vice President

W. A. Nugent recently was elected as vice president in charge of sales of the Independent Pneumatic Tool Co., Chicago, Neil C. Hurley Jr., was named secretary. Mr. Nugent has been connected with the company for 20 years, serving in various executive capacities. Mr. Hurley has been in charge of the distribution of the line of electrical tools produced by that company.

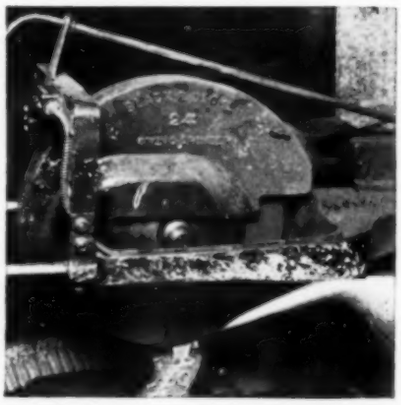
Transferred to Detroit

W. V. Emery, for the past 10 years connected with the Harnischfeger Corp., Milwaukee, has been transferred to the Detroit office of that organization where he will have charge of the arc welder sales in the Detroit district.



Electric overhead crane which has been in service in the shops of the Union Pacific railroad for 44 years

WITH RAILROADS AS WITH GRINDING
yesterday's speeds won't do



Illustrated above is a typical snagging operation with a Bakelite Resinoid Bonded High Speed Wheel.

★*The Trademark* "REDMANOL" *is also used to indicate abrasive products bonded with our resinoids.*

In pre-aviation days train speeds that at times approached a mile-a-minute seemed marvelously swift, but compared with today's streamlined trains they were very slow. Likewise to industries educated to the economies of high speed tools and machinery, the "fast" grinding speeds of a few years ago seem slow and wasteful compared with the high speeds of abrasive wheels bonded with Bakelite Resinoid. ¶ These Bakelite Bonded wheels possess such strength of structure that they may be safely operated at speeds up to 9,000 S.F.P.M. on snagging work, and 16,000 S.F.P.M. on cut-off. Grinding time is correspondingly reduced and unit cost lowered. Consult any leading abrasive wheel manufacturer★ about the economies of Bakelite Bonded Wheels, and write to us for a copy of booklet 15G—"High Speed Abrasive Wheels".

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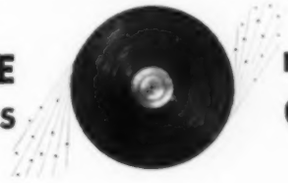

FOR HIGH SPEED GRINDING

Pilgrim puts one over on Pride

The Adventures of Bill

BY PAT DWYER

KNOWING Bill's peculiar faculty of hobnobbing with all kinds of people and thus accumulating a varied fund of information useful and otherwise, I asked him in the course of a more or less desultory conversation the other night if he had garnered any stray items, that is items out of the ordinary at the recent convention and exhibition of the foundrymen in Philadelphia.

"Well," said Bill, "I'll tell you. What with the rush and the hurly burly and racing around from one place to another I did not have a chance to linger long in any one place. I ran into Max Kuniansky one day — you know Max, G. M. and so forth Lynchburg Foundry Co., Lynchburg, V. A., the Old Dominion, Suh—and started to kid him about an experience he had last summer while driving on one of the Michigan highways. A state trooper on the lookout for the notorious outlaw Dillinger stopped the car and —as I had the story — Max had quite a job wiggling out of his clutches.

"Max assured me the story had been greatly exaggerated. In fact it was one of these kind of lies in between plain lies and statistics. He admitted that the cop stopped him, but excused himself later for an error of judgment.

"'He says to me'—Mr. Kuniansky speaking—'He says to me, Hey feller, what's the big idea? Don't you know you're doin' over 60 miles an hour? An' I says to him, Why, officer, that's a ridiculous statement. It's only half an hour since I started! The cop scratches his head with his pencil and says, Boy, that's a new one on me. O. K. Go ahead.'

"I assured him," Bill continued, "I was glad to have the authorized version and that the embarrassing suspicion of being mistaken for a highwayman did not remain as a stain on the old family escutcheon. I also was pleased to learn that the bird doing sentry duty on the highway displayed more intelligence than usually is attributed to the flat foot tribe. Max modestly admitted that an open and ingenuous countenance plus a ready wit are factors not to be despised in these little roadside meetings.

"That reference to roadside meetings reminded me of my original reason for flagging Max as he rushed by like that flying trapeze fella, or perhaps to be more accurate, like what's his name Absalom, with his hair streaming in the wynd. Get that, wynd, not wind."

"Wynd or wind," I said. "They're all the same in a long yarn. So what?"

"All these poetical fellas say wynd," Bill explained patiently. "Since this is a poetical yarn as you might say, the word is wynd. This story is about a lady and a duck."

"A lady and a duck?"

"Nothing wrong with your ears. A lady and a duck, a cast iron duck."

"A cast iron duck? Say, what is this, a guessing contest? You're too fast for me. Remember I am only a little country boy a long way from home and I can't keep up with you city slickers. Is this lady with the duck mixed up with Dillinger and the Michigan state highway patrol? Have you ever heard of the old fashioned way of beginning a story at the beginning so that the listener may have some kind of an inkling of what it is all about?"

"Have *you* ever heard the story about the wise old owl who lived in the oak? The more he heard the less he spoke. The less he spoke, the more he heard. Wasn't he the wise old bird! Just emulate the owl, my lad and maybe eventually you'll acquire enough wisdom to realize that I am beginning the story at the beginning, in other words the title: The Plain Unvarnished Tale of a Duck."

"But a cast iron duck—."

"Avast, ye lubber, an' silence 'tween decks! Must I go down there with a belayin' pin? At one time or another rumors came drifting up around these here parts of a new species of duck appearing down around Lynchburg. Discreet inquiries elicited no further information, than that it was fairly domesticated, required neither food nor drink, would remain indefinitely in one place if not disturbed, showed no migratory tendencies, never indulged in the loud and vulgar quacking of the barnyard variety and in a word was a perfectly ducky duck.

(*Continued on page* 63)

Cabbages, kings and sealingwax and whether iron ducks lay eggs

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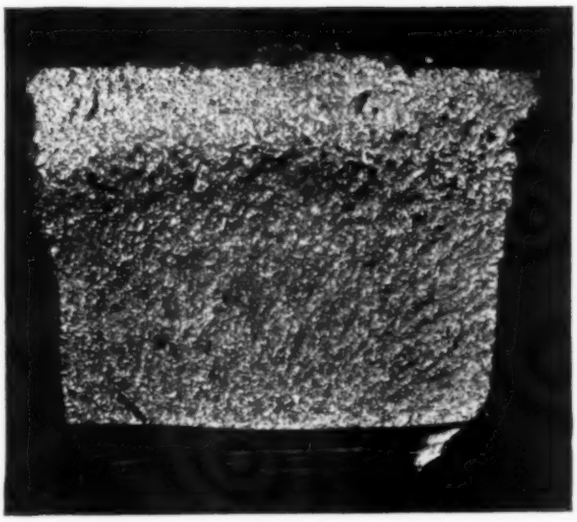
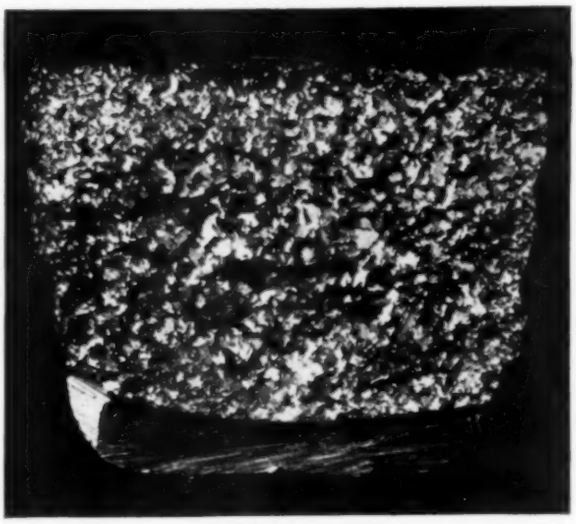


The fine grained structure of this fractured cast steel clearly indicates the effect of nitrogen. This cast steel contains 27.35 per cent chromium, 0.56 per cent carbon, 0.34 per cent nickel and 0.32 per cent nitrogen.



This coarse grained structure is that of a fractured cast steel containing only a trace of nitrogen. Analysis shows 27.85 per cent chromium, 0.50 per cent carbon, 0.75 per cent nickel and 0.06 per cent nitrogen.

★ Grain refinement of high chromium steels can be obtained by the addition of small percentages of nitrogen in the form of High Nitrogen Ferrochrome.

Castings for valves, pumps and fittings that are subjected to extremely corrosive conditions must combine corrosion resistance with strength and toughness. The use of steels containing over 20 per cent chromium gives the necessary corrosion resistance. Castings with high chromium content often have coarse grain structure and lack desired toughness. Nitrogen introduced with the chromium refines the grain and develops the inherent strength and toughness of the metal. The proper ratio of nitrogen to chromium is contained in a single Electromet alloy offered as High Nitrogen Ferrochrome which can be introduced into the castings by furnace additions.

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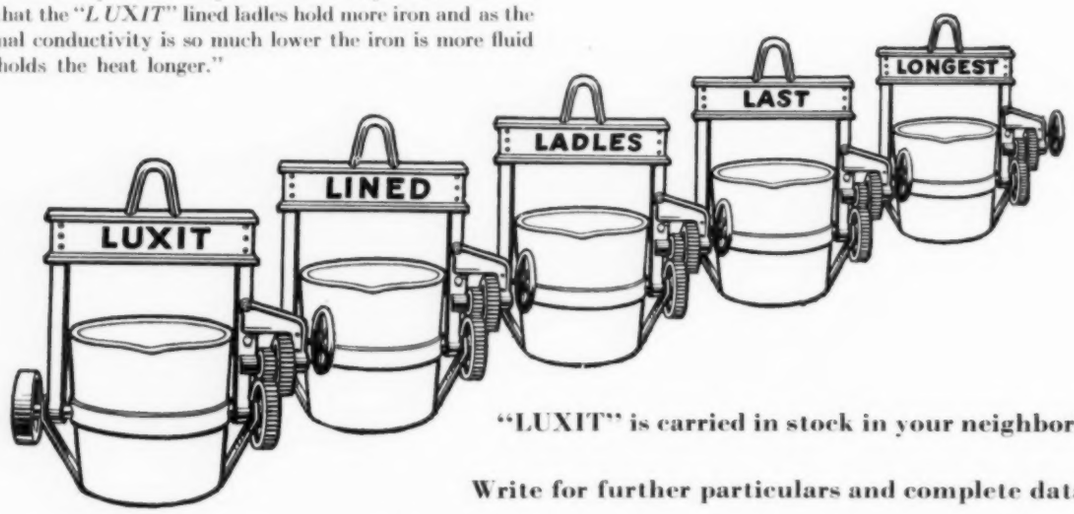

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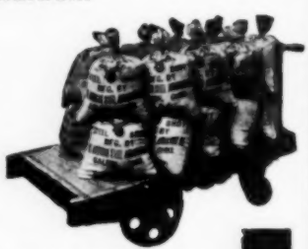
Because of comparatively small bulk it is stored INSIDE.

It is all ready for use at any time.

And there is no problem of disposing of spent abrasive.



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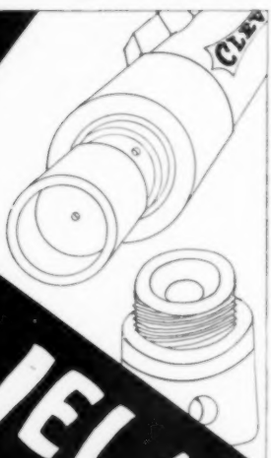
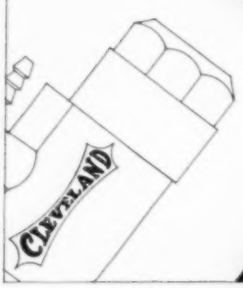
Galion, Ohio

FOR Better RESULTS Try CLEVELAND Superior Built VIBRATORS



Send for ILLUSTRATED CATALOGUE CLEVELAND VIBRATORS and VALVES



CLEVELAND VIBRATOR CO.,
2100 Superior Ave. W. Clev. O.

(*Continued from page* 60)

These birds maintained a dignified poise at all times and paid absolutely no attention to confreres, wild or tame. Particularly noteworthy were the eyes, round, full and beaming with intelligence as opposed to the narrow, mean, shifty, treacherous little eyes of the ordinary domestic duck, probably, with the exception of those in a snake, the most crafty, deceitful eyes in any living creature. Have you ever taken a good look at a duck's eyes?"

"Why should I go around peering at duck's eyes? The only time I am interested in a duck is when the browned body, nicely stuffed with onions appears in front of me on the table. So far as I can remember, the eyes invariably are missing on these occasions. Push on, lad, push on!"

"Keep your feathers on. These ducks ain't going to fly away."

"Maybe not, but I may."

"Lend me one of your matches. Well, as I was saying I pondered over this duck story quite a bit off and on and when I finally learned that it was a cast iron duck I determined that the first time I saw Max I would ask him for the real low down, the inside story on this duckery, or whatever they call a duck factory."

"What did he tell you? I suppose he set a clutch of rusty civil war cannon balls under an old quacker, and believe it or not, hatched out a flock of cast iron ducks!"

"Well," Bill admitted judiciously, "that's an idea which I am free to confess did not occur to me. However, as a plain matter of fact the egg stage and the hatching stage are eliminated entirely in the propagation of this particular species of duck. A rather unique distinction since in that respect they are on a par with Adam and Eve and all the other creatures which first inhabited the earth.

"According to the genial Max the vision of a cast iron duck came to Mrs. E. Barksdale one day as she stood contemplating the lilies in her garden pool. 'Heck,' says this charming Virginian lady to herself — or whatever it is that charming Virginian ladies say to themselves under similar circumstances — 'Heck,' says she, 'the appearance of this pool would be improved 75 or perhaps 80 per cent if one or two aquatic birds were perched on the flat stone border.'

"Her mind daintily recoiled from the prospect of providing live ducks, noisy, filthy brutes with detestable table manners and — as I said before —the mean, vicious little eyes of the natural born scavenger. She wanted something that would blend harmoniously with the quiet, peaceful surroundings. Something subdued, dignified, aesthetic and permanent. Naturally her imagination immediately conjured a vision of a cast iron duck."

"I don't quite follow your line of reasoning. Why should cast iron pop into her mind? So far as my observations extend the average lady knows about as much about cast iron as she does of, say, the fourth dimension. Now if you had said a wooly duck, a hand painted wooden duck or a calico duck with a hand embroidered antimacassar around the neck—"

"My dear lad cease quacking and listen. Mrs. Barksdale is not an ordinary lady. She is the wife of Dr. E. Barksdale who looks after the lads in the foundry. She is sister-in-law of J. C. Barksdale, works manager of the Lynchburg plant, sister of H. E. McWane, president of the company and therefore active member of a family of iron masters prominent in southern industrial life for many generations. She is the original of the young lady on the plow picture which adorns the cover of the plow catalog issued by the company. In a word—"

"All right," I said. "All right. In a word she knows cast iron."

"I like to talk to bright young fellows like you. Quick on the uptake. Require no explanation. Saves so much time. Le's see, where was I when you quacked your way into the picture?"

"The lady had decided to buy an iron duck."

"The original idea, as you astutely surmise, was to buy the bird, but unfortunately when she came to look around, she found that up to that time no enterprising dealer had stocked up with the cast iron variety. She checked up on the list and found mallards, black ducks, musk ducks, canvasbacks, shovelers, gad walls, pin tails, wood ducks, teals, eider ducks, scoters, red heads, blue bills, old wives, harlequins, golden eyes, widgeons and hell divers. Clearly it was up to some one to come to the aid of the party and add a cast iron duck to the list. She does not believe in any of that old baloney about letting George do it. When she wants something done, why, she just goes ahead and does it.

"In this particular instance she secured a good size wad of modeling clay, removed the diamonds and other feminine insignia from her deft and capable fingers and sculped an elegant model of a duck in contemplative mood. She looked on the work of her hands and it was good. On second thought, she decided that as with men, it is not good for ducks to live alone. She sculped a second figure with the head thrown back in an attitude of bravado and with the beak or bill thrust upward at an angle of approximately 87 degrees to the horizon, a ducky replica of Ajax defying the lightning.

Leads the ducks to water, but he can't make 'em swim

"When the clay bird was taken down to the shop the foundryman was left to his own devices. He had to figure out some way of transforming the clay into iron. He was not familiar with the studio methods of making plaster casts, but he decided that what had been done before could be done again. He carefully wrapped the model in thin wax paper, bedded it in a false cope and made the parting. He then filled the drag with plaster. After the plaster had set the assembly was turned over, the false cope shaken out, replaced and filled with plaster. The two parts then were separated and the clay model removed. Each half mold then was filled with plaster to form a split plaster pattern.

"Probably if he had the job to do over again he would not bother with the paper or the false cope. He would place a few small supports in the empty drag. Place the clay model on these supports and then fill the drag with plaster. In fact he might dis-

(*Concluded on page* 66)

Obituary

STERLING E. DOSTER, 51, president, Superior Steel & Malleable Castings Co., Benton Harbor, Mich., died at his home in that city, Nov. 19. Mr. Doster was graduated from the Converse, Ind., high school in 1900 and immediately entered the employ of the National Car Coupler Co. of that city. In 1904 he became associated with the Marion Malleable Iron Co., Marion, Ind., where he remained until early in 1907 when he rejoined the National Car Coupler Co. in its new plant in Attica, Ind. He filled various positions with that firm until 1916 when he had become secretary. In February of that year he joined with W. R. Gilmore in the organization of the Superior Steel Co. with a new plant at Benton Harbor, Mich. In 1921 a malleable iron unit was added to the plant and the name was changed. Mr. Doster continued to act as president until his death. He was active in the affairs of the Steel Founders' society and the Malleable Iron Research institute.

* * *

P. H. McArdle, 76, president and founder, P. H. McArdle Equipment Co., Houston, Texas, died Nov. 12.

* * *

Wayne Rawley, 66, vice president and director of Blaw-Knox Co., Pittsburgh, died at Miami Beach hospital, Miami Beach, Nov. 16.

* * *

Matthew J. Kelly, managing director, Guelph Stove Co., Guelph, Ont., died in that city, Nov. 2. Mr. Kelly was a native of Hancock, Mich.

* * *

W. E. Stephens, secretary and treasurer, Roberts & Mander Stove Co., Philadelphia, died Nov. 1 following an automobile accident.

* * *

Antonius C. Albrecht, 77, president, North Bros. Mfg. Co., Philadelphia, died at his home in Philadelphia Nov. 16.

* * *

Jacob A. Rappaport, 53, president, Reliance Bronze & Steel Corp., 95 Dobbins street, Brooklyn, N. Y., died Nov. 15.

* * *

Dr. Karl von Linde, 92, originator of the Linde process for manufacturing liquid air, oxygen and other gases, died at his home in Munich, Germany, Nov. 16.

* * *

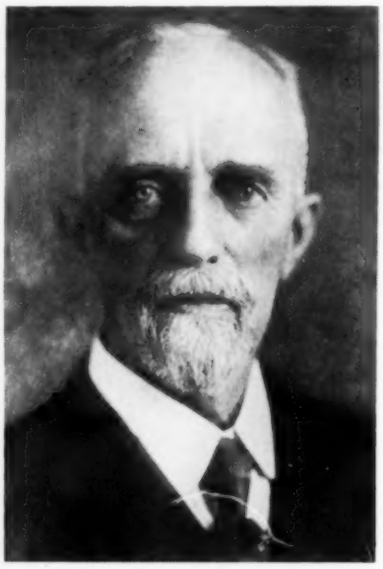
EMERY E. DUNNING, 70, president, Dunning Furnace Co., Milwaukee, died recently. For 27 years he was chief engineer of the Schwab & Sercomb Foundry & Furnace Co., resigning in 1926 to establish his own business.

* * *

S. J. Workman, superintendent, Agricola Pipe Foundry, Gadsden, Ala., died in Birmingham, Ala., recently. Mr. Workman had been connected with the pipe producing industry for many years.

* * *

Charles O. Bartlett, 84, who with K. F. Snow in 1885 founded the C. O. Bartlett & Snow Co., Cleveland, manufacturers of heavy machinery, foundry equipment and other products, died at his home in Brecksville, O., near Cleveland, Nov. 28. Mr. Bartlett was born in Strongsville, O., and as a young man operated several mills before founding the machinery company. He was president of the C. O. Bartlett & Snow Co., until 1922 when he retired, but continued his interest in the affairs of the organization. He was active in work of the National Metal Trades association for a number of years, serving in 1918 as president of the Cleveland branch of this organization.



Charles O. Bartlett

* * *

Morris D. Robinson, 63, for past 23 years general manager of the Philadelphia territory, Crane Co., Chicago, died in Philadelphia Nov. 1. At one time Mr. Robinson was associated with the Illinois Malleable Iron Co., Chicago.

* * *

George B. Walker, 71, treasurer and director, Whitehead Bros. Co., New York, and for 51 years connected with that company, died in Chatham, N. J., Nov. 1, after a brief illness. He was also treasurer of the Penn Facing Mills Co.

* * *

Pliny E. Holt, 62, chief engineer, Holt Mfg. Co., Stockton, Calif., and designer of an army tank, tractors and gun mounts during the World war, died in Stockton Nov. 18. Mr. Holt recently was vice president and chief engineer of the Caterpillar Tractor Co.

* * *

Wendell P. Anglemyer, 67, retired industrialist, and president and one of the founders of the Star Foundry Co., Troy, O., which recently was sold to the Hobart Mfg. Co., died at his home Nov. 5. Mr. Anglemyer went to Dayton 19 years ago where he was associated with the Standard Foundry Co., and several other firms.

* * *

Marcus W. Saxman, 65, president, Latrobe Electric Steel Co., Latrobe, Pa., a director of the Vulcan Mold & Iron Co., Latrobe, and one of the owners of the Conemaugh Iron Works, Blairsville, Pa., died at his home in Latrobe Nov. 20. Mr. Saxman was identified prominently with civic life in Latrobe and was associated with a number of coal and coke interests in that district.

* * *

W. L. Clements, 73, for 26 years president of the Industrial Works, Bay City, Mich., which later was absorbed by the Brownhoist Corp., died at his home in Bay City, Nov. 6. Mr. Clements was a graduate of the University of Michigan, Ann Arbor, Mich., and a former regent of that institution. In 1923 he donated to the university a new library which included many notable documents and volumes. He retired from business in 1924.

* * *

Charles Morton Parker, 66, former president, American Radiator Co., New York, died recently in Los Angeles. Mr. Parker, son of one of the founders of the American Radiator Co. received the degree of civil engineering from Rennsselaer Polytechnic institute in 1889. The following year he entered the employ of the Denver, Rio Grande & Western railroad where he served several years before becoming associated with his father in the St. Louis Radiator Co. Mr. Parker retired in 1926.

* * *

Edgar E. Durant, 82, for 63 years a hardware manufacturer in New Haven, Conn., died at his home there Dec. 2. Recently he sold his business the G. F. Warner Mfg. Co., to the National Folding Box Co. In 1871 he joined the staff of the G. F. Warner Co., in the capacity of office boy, shipping clerk and bookkeeper. He advanced through various positions and in 1900 he bought out the interests of all other members and became sole owner, a position which he retained until he retired from business last fall.

* * *

U. E. Kanavel, 70, one of the organizers of the Peerless Sand Co., Conneaut, O., died at Brown Memorial hospital, Conneaut, recently. Mr. Kanavel was born Aug. 18, 1864 at

(*Concluded on page* 66)

BESIDES CUTTING FOUNDRY COSTS

Cannon

Interchangeable

PINS & BUSHINGS

Prevent wedging!

Used by the largest foundries all over the world, they eliminate trouble and loss of money caused by broken, bent or jammed flask pins.

The drag cannot shift and the cope is held in perfect alignment. Wedging cannot occur as pins are short.

Easily installed with Standard Reamers. Stock sizes available. Moderate cost.

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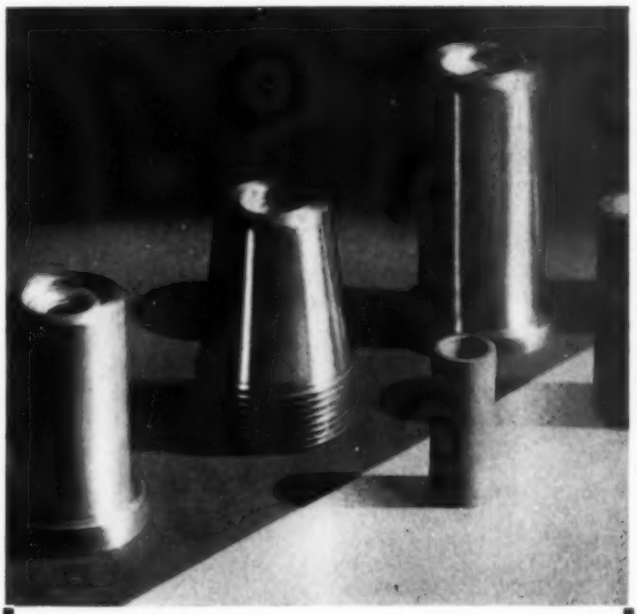
Sole Licensee
DETROIT, MICH.

SUPER-TAMASTONE

A HARDER-STRONGER PATTERN COMPOUND. DUPLICATES PATTERNS, MATCHPLATES and WILL MAKE COMPLETE MATCHPLATES FROM LOOSE PATTERNS. SETS IN 1-HOUR WITHOUT SHRINKAGE-MOISTURE PROOF-ABSOLUTELY ACCURATE -SMOOTH AS GLASS.

WRITE TODAY FOR COMPLETE DETAILS and PRICES.

FOUNDRY DIVISION
TAMMS SILICA CO.
228 N. LASALLE ST., CHICAGO



IF YOU WANT ONE OF THESE GUARANTEED

1500 HOUR WITH STEEL—750 HOUR WITH SAND

PANGBORN—NORBIDE* PRESSURE BLAST NOZZLES

*NORTON BORON CARBIDE

YOU HAD BETTER ORDER IT NOW

The demand for this new and sensational Blast Nozzle has exceeded all anticipation. Users who have had one or two on trial, find them so far superior to any other nozzle that they are now ordering in substantial quantities. As the manufacturing process is naturally slow, and as over 260 nozzles were ordered in November—we suggest you send in your order for the New Year NOW—if you would avoid costly delays.

Also send for our free file of facsimile letters from satisfied users.

PANGBORN CORPORATION

The World's Largest Manufacturer of Blast Cleaning and Dust Collecting Equipment

HAGERSTOWN . . . . . MARYLAND

(*Concluded from page* 64)

West Carlisle, O. He taught school in Coshocton county for seven years and then went to Zanesville, O., where he became associated with Edward M. Ayres in road construction and molding sand production. In 1905 he moved to Cleveland and organized the Interstate Sand Co. serving as manager for 5 years. He then went to Conneaut where he became associated with F. E. Gordon in the Ohio Sand Co., and in 1918 with Fred Moore and C. M. Bixler he organized the Peerless Sand Co. Mr. Kanavel retired from active business in 1923.

* * *

Col. George Watson French, 76, one of the co-founders and president of French & Hecht, Inc., Davenport, Ia. died in that city, Nov. 27. Upon his graduation from Phillips academy, Andover, Mass., he became associated with his father in the Eagle Mfg. Co., in the manufacture of agricultural impiements, entering the plant as an apprentice and progressing through various positions until he became president, shortly before the death of his father. In 1888, he joined with W. P. Bettendorf to form the Bettendorf Metal Wheel Co. With his brother, Judge Nathaniel French and J. L. Hecht, the firm of French and Hecht took over the wheel company in 1909, Mr. Bettendorf turning his attention to car manufacturing. The company was reorganized and incorporated in 1927. Col. French organized the Sylvan Steel Co., Moline, in 1897 and on the absorption of that company by Republic Iron & Steel Co., in 1900, became a member of the board of directors and chairman of the executive committee of the latter firm. He was a director of the Rock Island railroad, president of the Mexican Gulf & Lumber Co. and was widely interested in political, community and charity activities. He is survived by his widow, his son G. Decker French, a brother and four grandchilden. Col. French's sister, the late Alice French, was famous in the literary world, writing under the pen name of Octave Thanet.

Made Export Manager

Frederick Salditt recently was appointed manager of the export division, Harnischfeger Corp., Milwaukee. Mr. Salditt has been connected with that organization for a number of years serving in the shop offices, service, engineering, sales and foreign departments.

The Harnischfeger Corp. this year is celebrating the fiftieth anniversary of the founding of the company.

Electro Lift, Inc., 30 Church street, New York, has moved its plant to Bloomfield, N. J. where larger manufacturing facilities are available.

Discusses Hardening Of Iron at Philadelphia

J. S. Vanick, development research department, International Nickel Co., New York, spoke on "The Hardening Of Cast Iron" at the regular monthly meeting of the Philadelphia Foundrymen's association held Nov. 14 at the Engineers' club, Philadelphia. T. E. Kihlgren, metallurgist, International Nickel Co., Bayonne, N. J. spoke on "Some Nickel Alloyed Bronzes and Nickel Silvers." Both talks were illustrated with lantern slides.

British Institute Plans Series of Meetings

British Institute of Metals and its local sections have planned a full program for the coming session. Three general meetings of the Institute — in March, May and September respectively — will feature a number of important metallurgical communications. At the May meeting, Prof. W. R. Bragg will deliver the twenty-fifth annual May lecture. The annual autumn meeting will be held in Newcastle-on-Tyne.

In addition to the meetings of the parent organization, monthly meetings will be held by six local sections, located in Birmingham, Glasgow, London, Newcastle-on-Tyne, Sheffield and Swansea. More than 40 papers will be read before these sections, while in addition there will be arranged visits to works, a supperdance and other social and technical activities.

The programs of each section are primarily designed to appeal to persons engaged in the local industries; thus, in Birmingham papers will be read on "The Production of Brass Ingots" and "The Rarer Metals — Gold, Silver and Platinum" (as used in the local jewelry trades).

G. Shaw Scott, 36, Victoria street, Westminster, London, S. W. 1, England, is secretary.

Book Review

The Economy of Abundance, by Stuart Chase, cloth, 327 pages, published by the Macmillan Co., New York, and supplied by THE FOUNDRY Cleveland, for $2.50 plus postage and in Europe by the Penton Publishing Co. Ltd., London.

The author defines the economy of abundance as a group of buildings, mines, and farms, vibrant with machines and connected by lines of energy and transportation; founded upon a series of scientific laws, proliferating into specific processes and inventions, and a set of human habits.

Many things are necessary if the economy of abundance, as defined, is to function properly. These include capacity operation of the plant on the balanced load principle; an unhampered flow of goods to the consumer; elimination of waste; conservation of natural resources; employment of a decreasing number of man-hours in industrial production; encouragement of research, new invention and a fairly high obsolescence rate for plant and processes; capital goods industry to grow only as technological improvements, mass purchasing power or mass demand requires; an even relationship in growth of physical production and debt; a distinction between use property and industrial fixed assets; economic decentralization; industrialization of most agricultural staples; shorter working hours for all; a wide extension of social service; continuation of industrial specialization; no narrow economic nationalism; revised and simplified political forms; and centralization of government.

The Adventures Of Bill

(*Concluded from page* 64)

pense with the supports by first filling the drag with liquid plaster and then lowering the clay model the required depth in the plaster.

"However, the only point worthy of consideration at the moment is that the ducks were cast shortly before the local artists had completed arrangements for their annual exhibition. Some one had heard — you know how even the most closely guarded secrets leak out occasionally — some person had heard of the ducks and prevailed on the owner to give the art world a treat. Posed against a background of yellow velvet the birds attracted a great deal of favorable comment. Every person with a pool wanted a duck. To meet the accumulated orders, a split wood pattern was made, also a corebox to reduce the avoirdupois from 21 to 12 pounds.

"You never know how these things are going to turn out. Remember the two chickens in every pot and the blue eagle in every window? Well, the two chicken movement was not so hot, but the cast iron duck movement seems to have a more solid foundation."

Study Test Bars

The American Society for Testing Materials, Philadelphia, reports that committee A-3 on cast iron is conducting a series of investigations on test bars, involving methods of making, correlation of test bar size and controlling section as shown in the specifications for gray iron castings. It is expected that when the final report of the study is made, proposed changes in specifications will be introduced.

How they do cut!

STERLITH and STERBON BAKELITE

. . . Modern cut-off wheels for modern cutting methods, each one of the proper grain and bond structure to cut the material you desire cut—cut it fast and clean, with a minimum of wheel wear.

At your immediate service!

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Factory and Office TIFFIN, OHIO

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Have you grinding problems?

There is a STERLING Engineer near you

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Sharp Edges for Fusion

Not a Weakened Deformed Stem

Ideal for Pressure Castings

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Cost No More than other chaplets

THE FEDERAL FOUNDRY SUPPLY CO.

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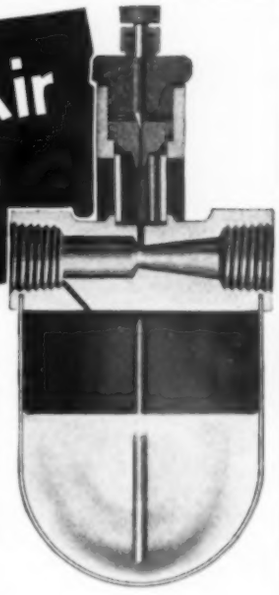
Oiled Air will be kind to your tools!



Obviously the safe, sensible, sure way to oil a pneumatic tool is to lubricate the air stream. Until now you haven't been able to do that properly. Even now, there's only one way—attach a Norgren Sight Feed Automatic Lubricator to the air line. Then the air slips along smoothly, carrying just the right amount of lubrication to every moving part.

Sight feed, adjustable, positive, continuous in operation, easily installed. No upkeep cost.

No installation ever made has been taken out! Sizes range from ¼ in. to 1½ in., prices $5.00 to $24.00. Two styles, horizontal and vertical. We'll ship on the order of any rated company, allow 30 days' trial, accept return of shipment if customer is willing to operate without it!

Descriptive circular on request.

C. A. Norgren, Co., Inc.
2017 Market St.,
Denver, Colorado.

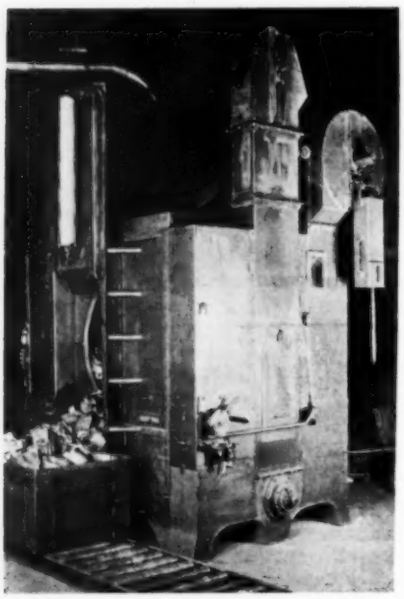
Try it at our risk

New Equipment

For Foundries

Abrasive Blast Applied Centrifugally

Pangborn Corp., Hagerstown, Md., recently has introduced a new centrifugal blast cleaning machine for castings of various sizes and shapes. The machine handles loads up to 18-cubic feet in bulk and averaging 2200 pounds



The machine requires low headroom and has a low point for loading

in weight. Time required for cleaning varies from 7 to 15 minutes, depending upon the characteristics of the castings.

The interior of the unit has two revolving drums and a stationary armor plate strip through the center. Action of the revolving drums throws the castings into this center strip directly under the abrasive stream created by a revolving wheel.

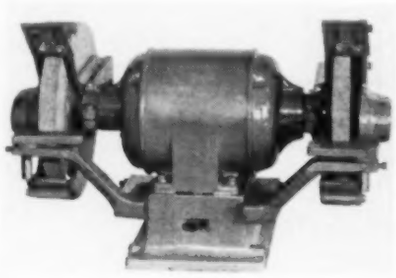
Operation of the machine is simple. The loading door is opened and closed by a quick-acting, easily controlled cylinder. An electric measured time clock automatcially operates a warning signal when cleaning is completed. Abrasive is used over and over again being thoroughly cleaned and handled by a separator and elevator unit built into the equipment. The loading point of the machine is low, and by reversing the travel of the drum the load flows out of the machine into tote boxes. Wires and oversized materials are removed by nonclogging, self-cleaning, screen wheels.

Valves Control Temperature and Pressure

Fox Engineering Co., 36 Portland street, Boston, has introduced a line of nonelectric, self-contained thermostatic valves for automatic and remote control of temperature and pressure. For lower temperatures the controls are actuated by a bellows of one piece construction. By using ordinary bimetal in place of a bellows, it is possible to control temperatures up to 1400 degrees Fahr. With bimetal made of platinum, control of higher temperatures may be accomplished. The thermostatic valves are designed for all types of oil burners where accurate temperature and pressure control is required.

Bench Grinder May Have Buffer Extension

Standard Electrical Tool Co., 1938 West Eighth street, Cincinnati, O., has introduced a special bench grinder which is supplied with wheels 10-inches in diameter and with a 1-inch face. The machine is designed for shops where requirements are not continuous, and is a supplement to the line of heavy duty grinders produced by that company. The unit is supplied with a buffer extension in place of grinding wheels on the right



The bench grinder is supplied with 10-inch wheels

Molding Unit May Be Moved Easily

Beardsley & Piper Co, 2541 North Keeler avenue, Chicago, recently has introduced a new sandslinger of the swing type. The unit, shown in the accompanying illustration, is designed for use on either production

Motor and paddle of the sandslinger are located close to the support

or jobbing work, dry or green sand molds and cores.

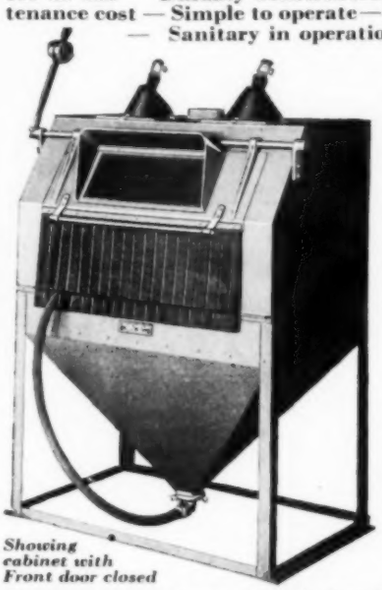
The principle of operation is identical with other sandslinger type molding machines manufactured by that company. Features include fast, uniform ramming, with density control at the fingertips of the operator, and availability to produce any size or shape of mold.

The equipment is suspended from a horizontal support through a universal joint. The motor and paddle are located close to the support and the sand is conducted vertically through an 8-inch pipe to a point above the flask or corebox. The entire assembly easily may be moved through a comparatively wide area by a handle attached to the lower end of the pipe. Sand is fed to this machine as in other types of sandslinger units.

RUEMELIN SAND BLAST CABINETS

(Patented)

Have proven most practical in service. More than 500 in use — Durably constructed — Lowest Maintenance cost — Simple to operate — Moderately priced — Sanitary in operation.



Showing cabinet with Front door closed

The large front door swings open for quick access to inside of cabinet.

Particularly well adapted to the requirements of brass and aluminum foundries.

• •

No time is wasted as operator is not required to walk to rear of cabinet for loading or unloading.

• •

Get our quotations on Cloth Bag Dust Filters, Sand Blast Rooms, Generators, Abrasive elevators.

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1587 S. First St. Milwaukee, Wis.

Foundrymen's Handbook

Second Edition

THIS second edition contains the most complete collection of formulas, tables, weights, specifications and information relating to foundry practice ever gathered together.

Invaluable to the foundryman, the pattern maker, the metallurgist and the executive. Gives, in most convenient form, the exact information you need to solve successfully any problems that may arise in your foundry operations.

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Over 300,000 Truscon Flasks are in active use today. Many have seen years of hard service but their efficiency has never lessened.

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FOR FAST CLEANING AND FINE FINISH standardize on Diamond Sand Blast Sand. It gives results that are impossible to duplicate with other forms of abrasives, and besides, it is the most economical cleaning agent you can employ.

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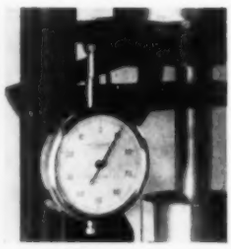

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Mold hardness governs casting defects such as Scabs, Rat Tails, Seams, Swells and Over-weight. It affects Blows, Cuts, Rough Finish and Drops. Use Mold Hardness Tester to standardize mold hardness.
Flowability of molding sand, a most practical sand property, is rapidly determined with Flowability Indicator.
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Better Castings Are Your Obligation.
Meet them with Sand and Mold Control.

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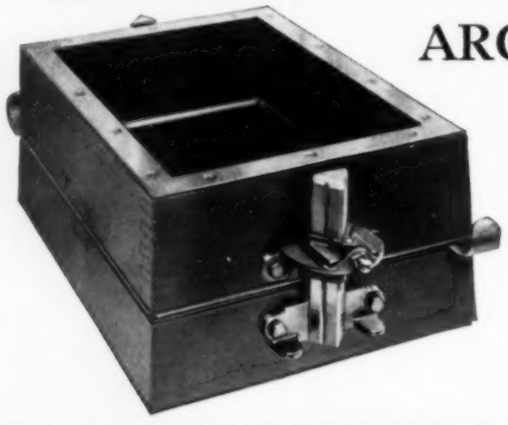
Mold Hardness Tester



ARCADE CHERRY SLIP FLASK

Highest Grade Lumber
Very Accurate Dimensions
Reasonable Prices
Jackets to Fit

ARCADE MANUFACTURING COMPANY
Freeport, Illinois

Device Indicates Flowability of Sand

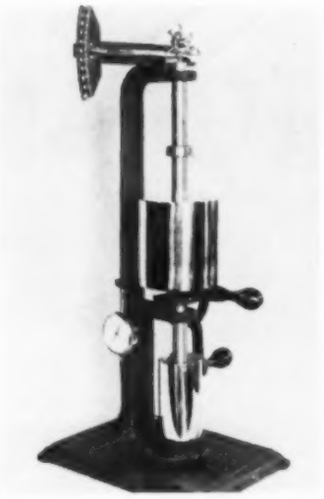
Harry W. Dietert Co., 676 West Grand boulevard, Detroit, has introduced a flowability indicator which consists of a dial indicator of special construction calibrated to read in percentage of flowability. The indicator is attached to the sand rammer by two screws. Indicator stem rests against the cross head of the rammer and registers the movement of the rammer plunger between the fourth and fifth drop as flowability.

Sand rammers not equipped with cross head may be used for flowability determination by attaching a special arm to plunger of the rammer to contact with the stem of the flowability indicator.

Flowability of molding sand is influenced by moisture content, permeability, fineness, clay content, strength and facing material additions. It may be controlled by increasing or decreasing any of these properties until suitable flowability is secured. The time required for making a flowability determination on molding sand does not exceed 1 minute. It is pointed out that the control of flowability in foundry sand will enable the production of castings with improved finish.

Electric Furnace Has Automatic Rocking Device

Detroit Electric Furnace Co., 825 West Elizabeth street, Detroit, has introduced a small electric furnace designed primarily for experimental work and test runs. The unit, which is rated at 35-pounds cold charge and 80-pounds molten capacity is provided with an automatic rocking device. The new unit has been engineered to increase the angle of rock of the furnace shell automatically. The rate of increase may be changed, one rate being available for ferrous and another rate for nonferrous metals. A feature of the rocking mechanism is that the shell velocity is zero at the point of reversal, although a constant speed motor is used. The shell is positively timed by a gear to the reversing mechanism.



Dial indicator is calculated to read in percentage of flowability

The new furnace is equipped with a special transformer and control panel. An oval shaped door is used instead of the square door previously employed. The electrode clamps are water-cooled and a special high temperature refractory is used, as well as interchangeable shells.

Made Representative

Garrett Burgess, Inc., 5050 Joy road, Detroit, has been appointed representative of the Magnetic Mfg. Co., Milwaukee, in the Detroit territory. They will handle magnetic separators, magnetic clutches, magnetic brakes, conveyor rolls and other magnetic equipment.

Flask Pins and Bushings Are Replaceable

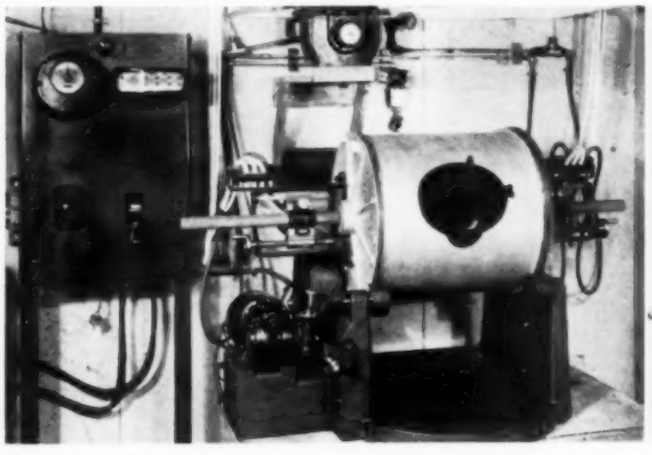
Federal Screw Works, 341 Martin avenue, Detroit, has introduced a line of replaceable flask pins for the drag and replaceable bushings for the cope. The ears on the drag, instead of carrying integral flask pins, are drilled to receive removable flask pins, using a standard reamer. These are placed tightly in place, the positions being gaged by a narrow flange which rests against the surface of the ear.

Although the fitting is termed a flask pin, it is also a bushing, and is made hollow to receive an extension guide pin. Bushings are designed to prevent any movement between the cope and the drag. Flask pins and bushings can be used in connection with existing flasks provided the ears are sufficiently large.

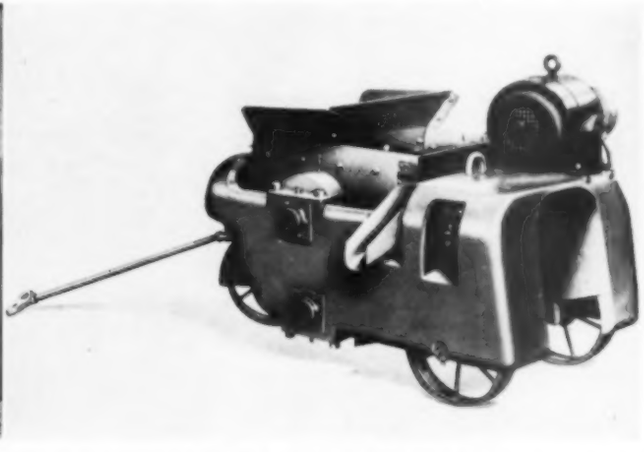
New Machine Conditions Molding Sand

Jeffrey Mfg. Co., Columbus, O., recently has introduced a portable machine for screening and conditioning molding sand. Sand is shoveled in the front of the unit, which is shown in the accompanying illustration, and the shovelling height is only 26-inches above floor level. Conditioned sand is thrown from the rear of the machine into fluffy windrows or piles. Refuse is removed by a positive eccentric type vibrating screen, and is discharged in a chute at the side of the machine.

The unit is housed in a one piece frame steel casting. The mechanism is driven by a 2-horsepower, totally enclosed, fan cooled, ball bearing type motor which runs at 1800 revolutions per minute. Push button control is employed. A sturdy front end assembly is provided to make steering easy under all floor conditions.



The unit has been engineered to increase the angle of rock of the furnace automatically



Sand is screened as it is shoveled in at one end and is discharged in piles at the opposite end

Introduces Two Jar Squeeze Machines

Tabor Mfg. Co., 6225 Tacony street, Philadelphia, recently has introduced two jar squeeze molding machines. One machine, shown in Fig. 1, has an overhead squeeze cylinder, 10-inches in diameter, with

Fig. 1—The machine has an overhead squeeze cylinder 10 inches in diameter

a table 16 x 19 inches. The upright member carrying the squeezing head is of chrome molybdenum alloy, instead of the 4-inch pipe previously used. The squeeze head is located centrally over the table of the machine and both the jar and vibration are controlled by knee-operated valves. Squeeze operation is controlled by a handle on the squeezing head of the machine.

A second type, shown in Fig. 2, is a new column jar squeeze molding machine. The machine is portable and has a 10-inch squeeze cylinder in the base which also carries the jarring cylinder. Both jar and vibrator are operated by knee-controlled valves. It is claimed that the head of this machine may be operated easily and that it is swung to and from the squeezing position with little effort. This machine also is equipped with vibrator, pressure gage and blow valve.

Makes Endless Belt

B. F. Goodrich Co., Akron, O., has introduced a new method of making belts endless. This consists of imbedding or counter-sinking the seam below the surface of the belt in such a position as to relieve the seam from strain and shield it from wear or windage. This protection is made possible by a thick cushion of rubber reinforced with bias fabric which is vulcanized permanently into position.

Meter Measures Intensities of Light

Weston Electrical Instrument Corp., 619 Frelinghuysen avenue, Newark, N. J., has introduced a foot-candle meter for measuring light intensities. To measure light in any particular area, the instrument is placed at the desired point, and the pointer indicates the light intensity prevailing there. The heart of the instrument is the photronic cell that is connected to a sensitive milliammeter. The scale is calibrated in foot-candles.

Portable Grinder Is Made in Two Sizes

United States Electrical Tool Co., 2490 West Sixth street, Cincinnati, recently has introduced a new portable grinder for removing stock and for finishing operations in foundries, pattern shops, and other industrial plants. The grinder may be obtained in two sizes, both having a speed of 17,000 revolutions per minute, and can be supplied with or without the back handle. A universal motor is used.

Committee A-1 on steel of the American Society for Testing Materials reports that the standard methods of chemical analysis of carbon steel and alloy steels are to be revised and brought up to date. An important change in the revised methods of procedure will concern the analysis of cast and wrought irons, that work being undertaken in co-operation with the committees on cast iron and wrought iron.

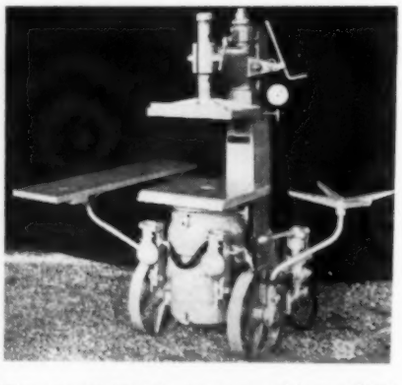


Fig. 2—Portable type machine which has an easily operated head

New Acetylene Generator Is Portable

Linde Air Products Co., 30 East Forty-second street, New York, has introduced a new portable acetylene generator which has a carbide capacity of 150 pounds. A unit is rated to produce 300 cubic feet of acetylene per hour. It weighs 750 pounds empty, is 87 inches over-all in height, and 42¾ inches in diameter. Fully

The unit is rated to produce 300 cubic feet of acetylene an hour

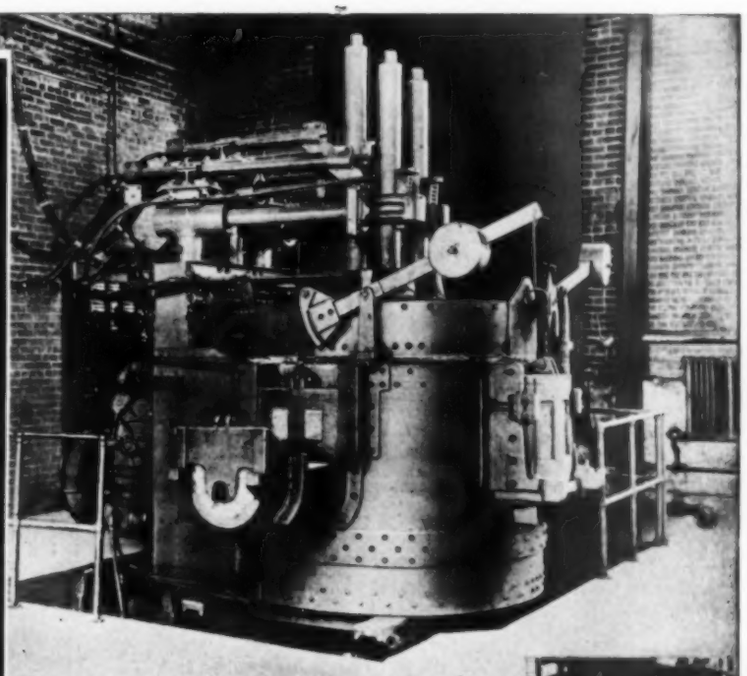
charged, the generator weighs 2250 pounds.

The feed is of the gravity type. The feed control unit is self-contained and is bolted to the inside of the carbide hopper. The feed valve unit is actuated by a diaphragm. Pressure on the diaphragm is exerted by a housed and loaded spring unit. The spring is encased in a small housing and set at the factory to deliver about 13 pounds per square inch pressure. This can be changed within a range of about 2 pounds per square inch pressure by an external adjustment. Several safety features are included in the unit.

Rack Tips Barrels

Barrett-Cravens Co., 3255 West Thirtieth street, Chicago, has introduced a rack which enables one man to place drums and barrels into a convenient position for draining. The rack is so designed that in tilting the barrel it does not become necessary to actually lift it until the barrel is away over on its side. The rack is made in two types, one with casters and another, plain.

We Recommend a *Heroult* ELECTRIC FURNACE to Meet Your Requirements



American Bridge Company designs and constructs electric furnaces for all standard requirements and is prepared to make special designs to answer special needs. Capacities, ½ ton to 100 tons, open-top, chute, machine, or hand charging. Basic or acid operation. Extra sturdy construction for turning out superior gray iron, steel, and other ferrous materials—particularly adapted for stainless irons and stainless steels. High-powered transformers and multiple voltage control give maximum efficiency and keep down costs of operation.

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SUBSIDIARY OF UNITED STATES STEEL CORPORATION

General Office: Frick Building, Pittsburgh, Pennsylvania

Contracting Offices: Baltimore, Boston, Chicago, Cincinnati, Cleveland, Denver, Detroit, Duluth, Minneapolis, New York, Philadelphia, Pittsburgh, St. Louis, Salt Lake City.

Pacific Coast Distributors: Columbia Steel Company, Russ Building, San Francisco *Export Distributors:* United States Steel Products Company, New York

Distinguished Atmosphere IN CINCINNATI

Hotel Sinton Cincinnati

700 ROOMS WITH BATH AND SERVIDOR

$2.00 PER DAY AND UP

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75 MODERN SAMPLE ROOMS WITH BATH OR SHOWER AT $2.50 TO $5 PER DAY

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$1.00 PER DAY EXTRA FOR ADDITIONAL OCCUPANT OF ROOM

A minute from everywhere... All bedrooms and suites modernized... Headquarters for the exclusive Town Club and Racquet Club ..A vital part of Cincinnati's polite Social Life... Successor to Cincinnati's famous St. Nicholas Hotel...The city's Quality Hotel

Finest of Fine Foods

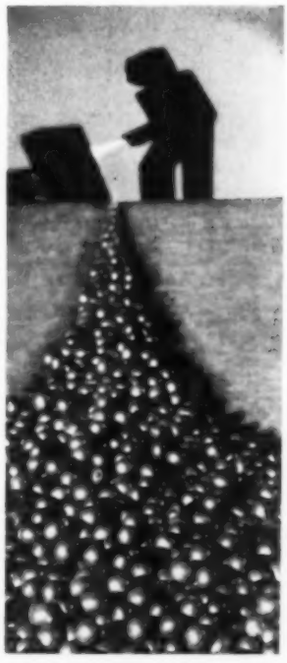
Dining Rooms ...Lunch Room ...Cafeteria .....Coffee Shop.....and the Sinton Cocktail Cafe reborn.

HOTEL

SINTON-ST. NICHOLAS

AN ATMOSPHERE OF CHARM AND DISTINCTION

"CERTIFIED" STEEL SHOT and GRIT



FOR ALL BLAST CLEANING

• •

• • Twenty bags of this popular abrasive will do the work of a car load of sand.

Easier to use.

Easier to store.

Decreases dust.

Easily cleaned

Used over and over again.

Send for information

Manufactured only by

PITTSBURGH CRUSHED STEEL CO., PITTSBURGH, PA.

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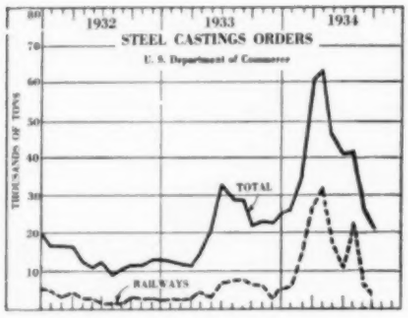
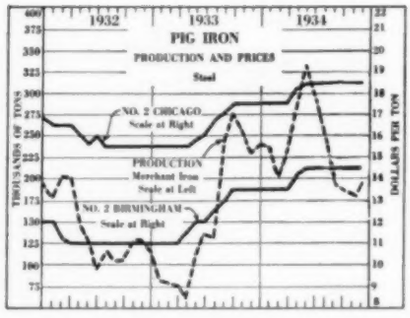
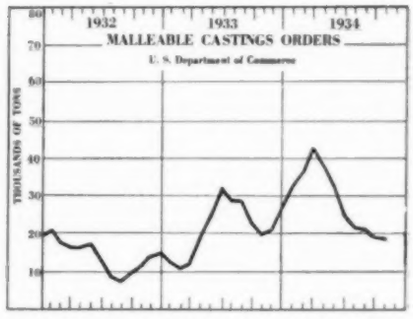
"Certified" Steel Abrasives are recommended by leading Blast Cleaning Manufacturers







Foundry Activities

Reflect Industrial Trends

FOUNDRY operations in the Chicago district were fairly steady during November, showing only slight change from the October rate but being higher than during the three preceding months. Schedules of jobbing foundries recently have been spotty, averaging around 30 per cent. Farm implement plants have shown the largest increase in operations the past six months of individual industries and have been an important factor in raising the average rate of melt in the district. November was the fourth consecutive month in which pig iron shipments have increased.

* * *

Excell Aluminum Foundry Co., Tecumseh, Mich., has been established by W. G. Snyder, Detroit.

* * *

Marion Machine Foundry & Supply Co., Marion, Ind., will erect a warehouse just north of the city limits of Mt. Pleasant.

* * *

Inland Mfg. Co., Dayton, O., has taken over the plant and buildings of the Standard Foundry Co., adjoining its property.

* * *

Border Foundry & Machine Co., Mirando City, Texas, recently was damaged by fire. The company will rebuild.

* * *

Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich. has purchased a Wheelabrator blast equipment for cleaning cast brake drums.

* * *

Krone Die Casting Co., Chicago, has been incorporated by W. F. Mayer, E. B. Patterson and J. M. Daugherty.

* * *

Canadian Bronze Co., Montreal, has purchased the railway bearing manufacturing business of the Robert Mitchell Co.

* * *

Home Owners Foundry Co., Louisville, Ky., has been organized by H. B. Jones, Jeff T. Dorsey and L. Leroy Highbaugh.

* * *

G. F. Warner Mfg. Works, New Haven, Conn., has sold its property and equipment. The plant will not be used as a foundry.

* * *

Index of orders for foundry equipment in October totalled 55.3 as compared with 46.4 in September, and 42.46 in October 1933, according to the Foundry Equipment Manufacturers association. Index of shipment was 51.5 in October compared with 37.0 during the previous month.

* * *

American Steel Foundries, 410 North Michigan, Chicago, is considering alterations to its Verona plant, and is reported considering purchase of equipment.

* * *

Grand Forks Foundry & Machine Co., Grand Forks, N. Dak., has been granted a building permit for the construction of an addition to its plant on North Second street.

* * *

National Bearing Metals Corp., St. Paul, Minn., has awarded a contract for alterations and remodeling for its brass foundry at 625 Armstrong avenue.

* * *

Ford Motor Co. of Canada, Ltd., East Windsor, Ont., is installing and equipping a new electric furnace foundry. Plans provide for further expansion.

* * *

Industrial Foundry Corp., Los Angeles, has been incorporated with the following directors: I. O. Farris, Hilma Farris, Bryce P. Gibbs, H. A. I. Wolch, and Margaret Powers.

* * *

Roselle Foundry Co., Roselle, N. J., recently has been organized to operate a nonferrous foundry by Edward H. Zoll and C. Parker Morgan.

* * *

International Harvester Co., Chicago, will build an addition to its plant at Springfield, O., which it is reported will cost $100,000 with equipment.

* * *

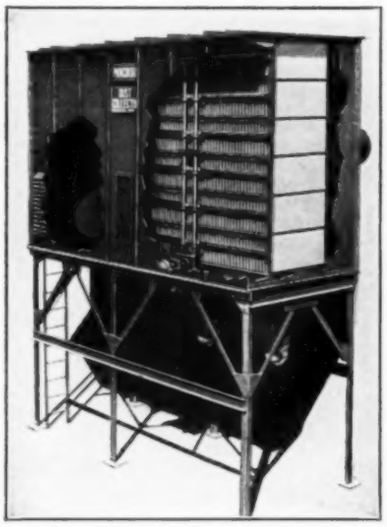
Fulton Iron Works Co., St. Louis,

(*Concluded on page 76*)

RAW MATERIAL PRICES
Dec. 6, 1934

Iron	
No. 2 foundry, Valley	$18.50
No. 2 Southern, Birmingham	14.50
No. 2 foundry, Chicago	18.50
No. 2 foundry, Buffalo	18.50
Basic, Buffalo	17.50
Basic, Valley	18.00
Malleable, Chicago	18.50
Malleable, Buffalo	19.00
Charcoal iron, furnace	21.00
Coke	
Connellsville beehive premium	$ 5.10 to $ 5.35
Wise county beehive coke	4.30 to 5.30
Detroit by-product coke	8.50
Scrap	
Heavy melting steel, Valley	$11.00 to $11.50
Heavy melting steel, Pitts	12.00 to 12.50
Heavy melting steel, Chicago	9.50 to 10.00
Stove plate, Buffalo	8.75 to 9.25
Stove plate, Chicago	5.50 to 6.00
No. 1 cast, New York	6.50 to 7.00
No. 1 cast, Chicago	9.00 to 9.50
No. 1 cast, Pittsburgh	13.50 to 14.00
No. 1 cast, Philadelphia	11.00 to 11.50
No. 1 cast, Birmingham	8.50 to 9.00
Car wheels, iron, Pittsburgh	12.00 to 12.50
Car wheels, iron, Chicago	10.25 to 10.75
Railroad malleable, Chicago	10.50 to 11.00
Malleable, Buffalo	10.50 to 11.00
Nonferrous Metals	**Cents per pound**
Castings copper, refinery	7.37½
Straits tin	51.05
Aluminum, 99 per cent	19.00 to 21.00
Aluminum, No. 12 (Standard)	15.00
Lead, New York	3.50
Antimony, New York	13.75 to 14.00
Nickel, electro	35.00
Zinc, East St. Louis, Ill.	3.70

GET RID OF DUST



Make 1935 a Dustless Year

PANGBORN Dust Collectors have served the Foundry Industry for over thirty years. The new type "CH" is an all metal frame, cloth screen collector, with vibrating mechanism that quickly removes all dust, yet prevents wear or tear on cloth screens. Unit construction makes great flexibility in size—fitting most any space. For large or small jobs. Send dimensions for price.

PANGBORN CORPORATION

WORLD'S LARGEST MANUFACTURER OF BLAST CLEANING AND DUST COLLECTING EQUIPMENT

HAGERSTOWN MARYLAND

PANGBORN

GOOSE LAKE

Illinois Clay Products Company

JOLIET, ILL.

Fire Clay and Fire Clay Flour

Fire Clay Brick

Therm-O-Flake Insulation

BY THE WAY, FRANK, DID YOU EVER TRY THAT MALUMINUM FLUX I RECOMMENDED TO YOU?
YES! WE TRIED IT ON THE TWO MOST TROUBLESOME JOBS WE HAVE, AND THE RESULTS WERE FINE.
HOW WERE THE CASTINGS IN THE MACHINE SHOP?
FINE! NOT A FLAW HAS SHOWN UP IN MACHINING

FLUXES *for*
ALUMINUM
BRASS
BRONZE

Ladle Flux for
CAST IRON

SPECIAL FLUXES *for* SPECIAL ALLOYS

THE MALUMINUM COMPANY TRANSPORTATION BUILDING NO. 263 INDIANAPOLIS, IND.

(*Concluded from page 74*)

recently submitted a plan to the federal court to reorganize the corporation under the debtor's law enacted a year ago.

* * *

Baden Furnace & Sheet Metal Co., 917 Baden street, St. Louis, has been incorporated by M. G. Nevins, and Karl Schmidt, Diamond drive and Gibson road, to operate a foundry and machine shop.

* * *

Wisconsin Gray Iron Foundry Co., West Allis, Wis., has reported a decided pickup in orders during November. That company points out that industrial machinery manufacturers have been the heaviest buyers of castings during that period.

* * *

Federal Malleable Co., Milwaukee, is engaging in the manufacture of a new type of brake drum which will for the present be supplied for replacement on Ford passenger cars and light trucks. The drums are of a special metal, heat treated to resist scoring and distortion.

* * *

Keen Foundry Co. Inc., Griffith, Ind., has changed its capital stock from $40,000 to $100,000. The same officers were re-elected as follows: President, L. E. Keen; vice president and secretary, A. M. Keen; treasurer, S. M. Beiriger. A news note in the November issue incorrectly located the company at Hammond, Ind.

* * *

F. J. Schwabe & Son, Fort Wayne, Ind., manufacturers of wood and metal patterns, recently has reorganized as the Schwabe Pattern Co. Inc. The officers are as follows: President, and treasurer, R. J. Schwabe; first vice president, Mrs. A. B. Schwabe; second vice president, Ruth E. Schwabe; secretary, Virgil Eisenhut.

* * *

Non-Ferrous Foundry of True Alloys Inc., 1825 Clay avenue, Detroit, has been taken over by J. P. Carritte and J. P. Carritte Jr., former executives of Detroit Aluminum & Brass Corp. The company operates a jobbing foundry producing aluminum and bronze castings for the automobile industry and for general purpose work.

* * *

Dollin Corp., Jersey City, N. J., has been formed to take over the die castings division of the American Type Founders Co., by Edgar N. Dollin, former president, Allied & Acme Die Casting Corp. The company also will take over the die casting division of the Lionel Corp. J. L. Cowen and Mario Caruso are associated with Mr. Dollin in the enterprise.

* * *

Output of gray and malleable iron castings increased during October in the Philadelphia district, according to a report of the industrial research department of the University of Pennsylvania, Philadelphia. Production of gray iron foundries was 10 per cent more than in September and the malleable iron output increased 19 per cent. Steel foundry activity in the area declined 28 per cent. In the gray iron field, the tonnage of castings for jobbing work increased 7 per cent, while that of castings used for further manufacture within plants operating a machine shop in conjunction with a foundry increased 30 per cent.

New Trade Publications

FOUNDRY EQUIPMENT—In celebrating the fiftieth anniversary of the founding of the company, the Whiting Corp., Harvey, Ill., has published a folder entitled "50 Years of Service To Foundries". The folder reproduces photographs of various types of equipment produced for foundries, including steel converters, air furnaces, quick-anneal ovens, pulverized fuel rotary furnaces, cupolas, cupola chargers, ladles, tumbling mills, cranes, pulverizers, dust filters, etc.

GRINDERS — Electrically driven drills, grinders and buffers as well as flexible shaft machines are described and illustrated in a recent catalog published by the United States Electrical Tool Co., Cincinnati, O.

FURNACES—General Electric Co., Schenectady, N. Y., recently has published a bulletin on its line of controlled-atmosphere electric furnaces for annealing, normalizing, brazing, and hardening.

MOLDING MACHINES — Herman Pneumatic Machine Co., Union Bank building, Pittsburgh, has published an interesting folder entitled, "Can You Produce a Mold Complete in Less Than 60 Seconds?" Reproductions of photographs show various operations and the text outlines the sequence of operations of the machine.

EXTENSION REELS—Cincinnati Specialty Mfg. Co., 1907 Powers street, Cincinnati, O., has published several bulletins on its automatic extension reel for electric lamps, portable drills, grinders, etc.

AIR FILTER—C. O. Bartlett & Snow Co., 6200 Harvard avenue, Cleveland, has published a bulletin on its new flotation type air filter which employs water and also a frothing filter carpet. Features claimed for the equipment also are discussed.

DUST FILTERS—W. W. Sly Mfg. Co., 4700 Train avenue, Cleveland, has published a bulletin on its line of dust filters. Information gives the construction features and the method of operation, while diagrams show the method of applying the filter unit.

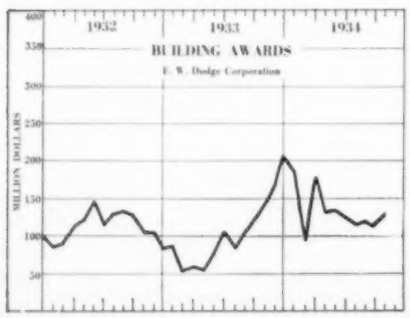
POWER SHOVELS—Bucyrus-Erie Co., South Milwaukee, Wis., has issued a booklet dealing with the specifications for the various units in its extensive line of excavating machinery, cranes, linings, hoists, jacks, blowers, etc. The publication is illustrated with numerous installation photographs.

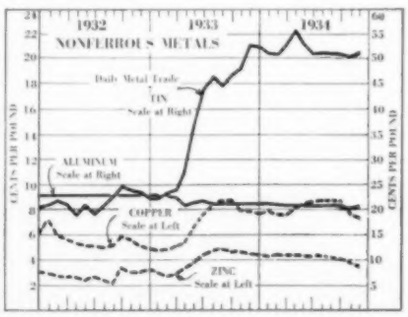
STOKER—Whiting Corp., underfeed stoker division, Harvey, Ill., has published a bulletin on the application of its stoker to the baking of cores in the foundry. In addition to the discussion of the features of such an application, illustrations show the method of installation.

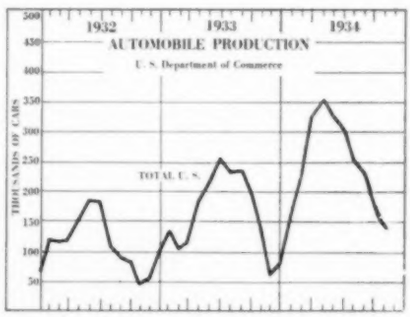
ABRASIVES—Norton Co., Worcester, Mass., has published a 30-page booklet on "Abrasives—Their History and Development." Interesting information on the development and manufacture of both aluminum oxide and silicon carbide abrasives also is presented.

WELDING EQUIPMENT—Alexander Milburn Co., 1416 West Baltimore street, Baltimore, has published a catalog covering its line of cutting and welding torches, pressure regulators, pressure gages, adaptors and manifolds and other accessories and supplies.

ELECTRIC MELTING — Detroit Electric Furnace Co., 825 West Elizabeth street, Detroit, recently has published a booklet entitled "Revenue From Electric Metal." The text includes discussions of what utilities are doing to develop electric melting, the reasons for electric melting, and the features of the rocking electric furnace made by that company. The discussion has been prepared primarily for utility men.







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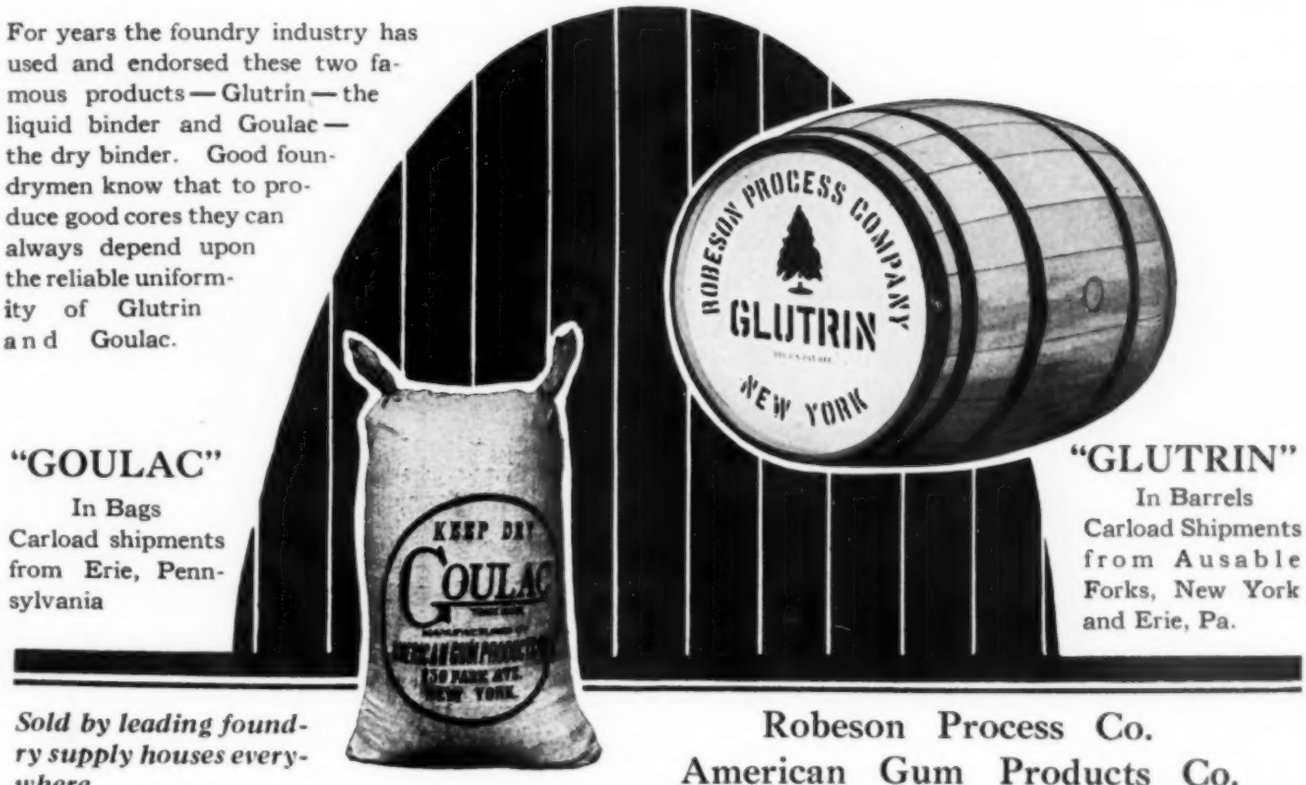

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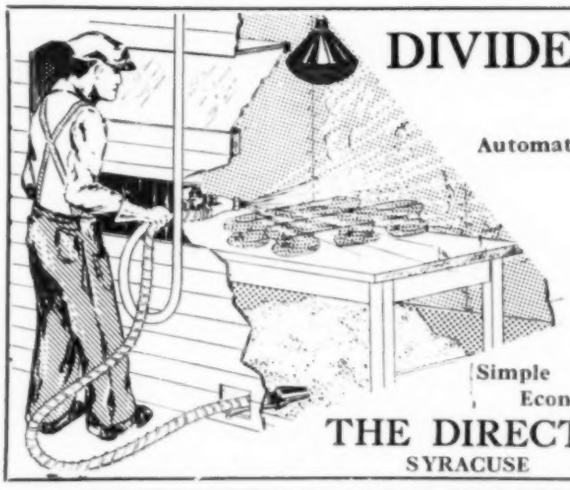

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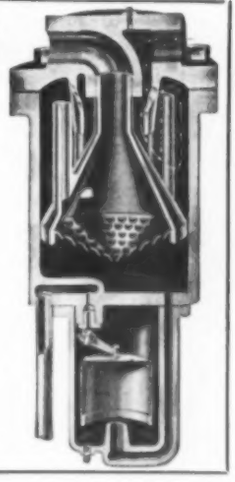

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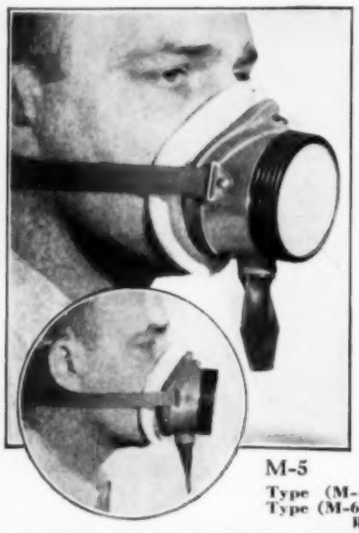

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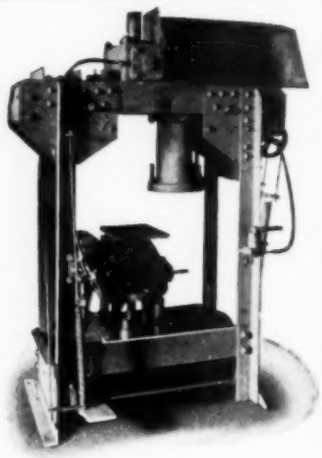

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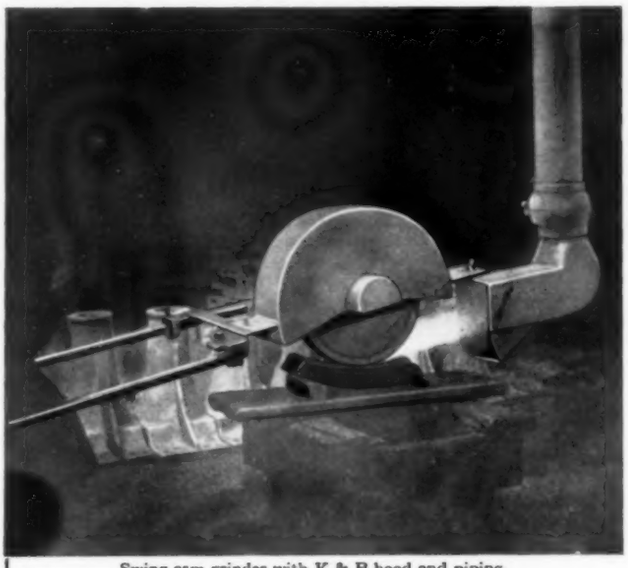

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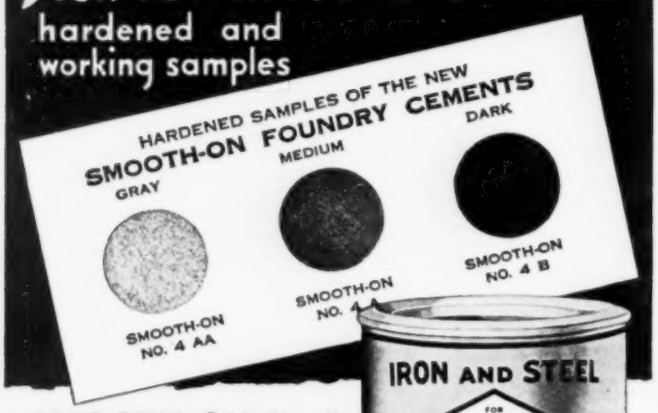

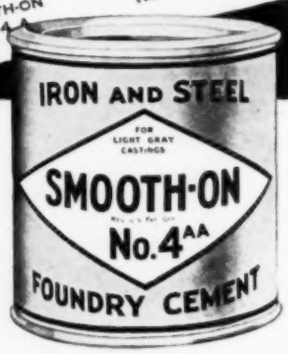

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☐ Hardened samples of all three

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12-34

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